

# Service Service Service

# LC4.41E AB

Supplement to manual LC4.41E AA 3122 785 16240



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170256

# Service Manual

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# 1. Technical Specifications, Connections, and Chassis Overview

## Index of this chapter:

- 1.1 Technical Specifications
- 1.2 Connection Overview
- 1.3 Chassis Overview

## Notes:

- Only information that is related to the IBO Zapper module is published in this manual. For the other information, see the relevant chassis manual (order code on front page).
- Some models in this chassis range have a different mechanical construction. The information given here is therefore model specific.
- Figures below can deviate slightly from the actual situation, due to the different set executions.
- Specifications are indicative (subject to change).

## 1.1 Technical Specifications

### 1.1.1 Vision

Display type	: Plasma
Screen size	:
- 42PF5521D/10/12	: 42" (107 cm), 16:9
- 42PF7521D/10/12	: 42" (107 cm), 16:9
- 50PF7521D/10	: 50" (127 cm), 16:9
Resolution (HxV pixels)	:
- 42PF5521D/10/12	: 1024 x 1080
- 42PF7521D/10/12	: 1024 x 768
- 50PF7521D/10	: 1366 x 768
Contrast ratio	: 10000 : 1
Light output (cd/m <sup>2</sup> )	: 1400
Response time (ms)	: 3
Viewing angle (HxV degrees)	: 160 x 160
Tuning system	: PLL
TV Colour systems	: PAL B/G, D/K, I : SECAM B/G, D/K, L/L'
Video playback	: NTSC M/N 3.58, 4.43 : PAL B/G : SECAM L/L'
Supported computer formats	: VGA (640x480) : MAC (640x480) : SVGA (800x600) : XVGA (1024x768) : VGA (720x400)
Supported video formats	: 640x480i - 1fH : 640x480p - 2fH : 720x576i - 1fH : 720x576p - 2fH : 1280x720p - 3fH : 1920x1080i - 2fH
Presets/channels	: 100 presets
Tuner bands	: VHF : UHF : S-band : Hyper-band

DVB : DVB - terrestrial

### 1.1.2 Sound

Sound systems : NICAM B/G, D/K, I, L  
: AV Stereo

Maximum power (W<sub>RMS</sub>) : 2 x 15

### 1.1.3 Miscellaneous

Power supply:  
Mains voltage (V<sub>AC</sub>) : 220 - 240

Mains frequency (Hz) : 50 / 60

Ambient conditions:  
- Temperature range (°C) : +5 to +40  
- Maximum humidity : 90% R.H.

Power consumption:  
Normal operation (W) :  
- 42" : 230  
- 50" : 360  
Stand-by (W) : < 2

Dimensions (WxHxD cm):  
- 42PF5521D/10/12 : 123.6 x 67.9 x 12.6  
- 42PF7521D/10/12 : 124.9 x 68.8 x 12.8  
- 50PF7521D/10 : 142.5 x 78.6 x 11.8

Weight (kg):  
- 42PF5521D/10/12 : 39.2  
- 42PF7521D/10/12 : 43.0  
- 50PF7521D/10 : 57.3

## 1.2 Connection Overview

**Note:** The following connector colour abbreviations are used (acc. to DIN/IEC 757): Bk= Black, Bu= Blue, Gn= Green, Gy= Grey, Rd= Red, Wh= White, and Ye= Yellow.

### 1.2.1 Rear Connections

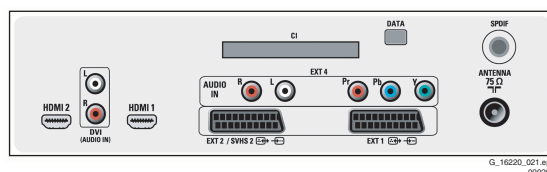


Figure 1-1 Rear I/O

#### CI Common Interface: PCMCIA

68p - See diagram K7



#### S/PDIF Cinch: Out

Bk - Coaxial 0.2 - 0.6 V<sub>PP</sub> / 75 ohm



#### Service connector (UART)

1 - UART\_TX Transmit  
2 - Ground Gnd  
3 - UART\_RX Receive



### 1.3 Chassis Overview

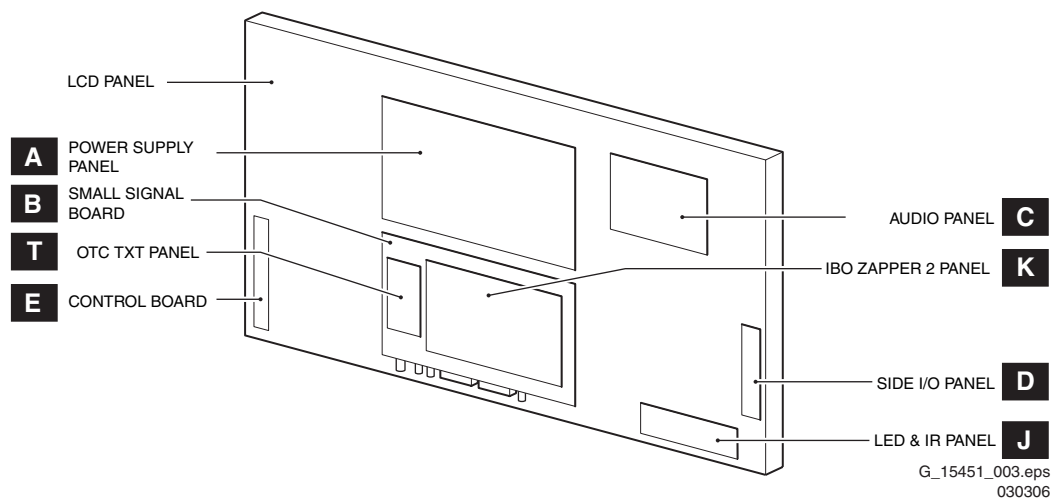


Figure 1-2 Chassis overview

## 2. Safety Instructions, Warnings, and Notes

See the relevant chassis manual (order code on front page).

## 3. Directions for Use

You can download this information from the following websites:

<http://www.philips.com/support>

<http://www.p4c.philips.com>

## 4. Mechanical Instructions

### Index of this chapter:

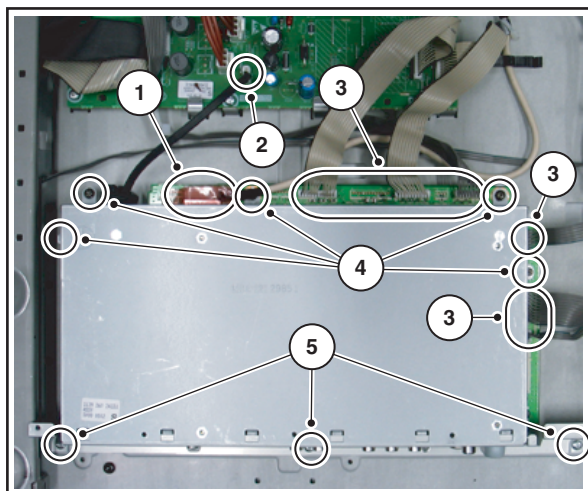
- 4.1 Assy/Panel Removal
- 4.2 Set Re-assembly

### Notes:

- Figures below can deviate slightly from the actual situation, due to the different set executions.
- Follow the disassembling instructions in described order.
- Only information that is related to the IBO Zapper module is published in this manual. For the other information, see the relevant chassis manual (order code on front page).

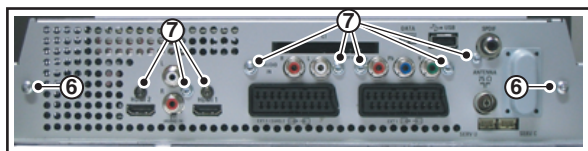
### 4.1 Assy/Panel Removal

#### 4.1.1 Cover Shield for IBO-zapper & SSB



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Figure 4-1 Cover shield

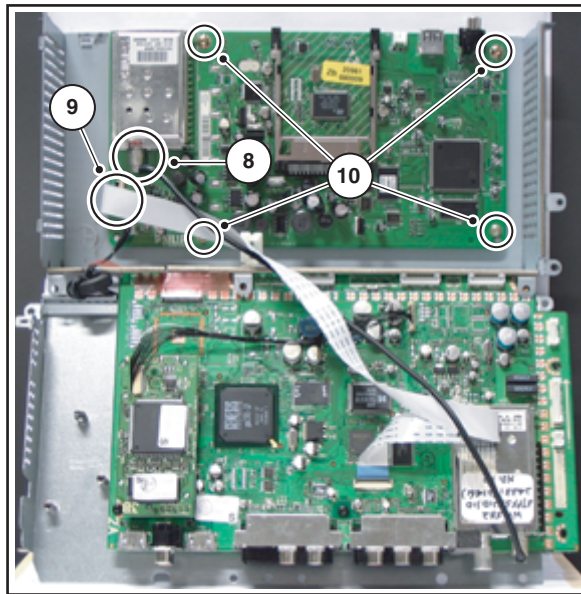


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Figure 4-2 Connector screws

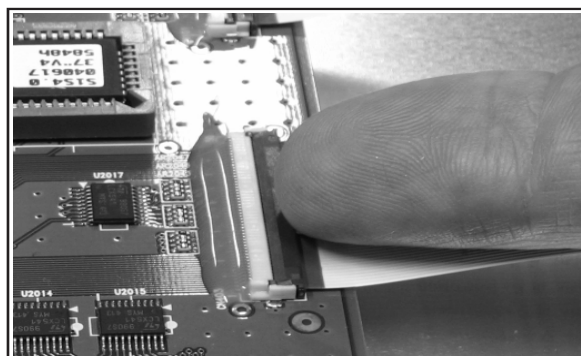
1. Remove the rear cover from the set.
2. Very **cautiously** disconnect the LVDS cable [1] from the SSB panel (see Figure "Cover shield"). Notice that this connector is very fragile.
3. Unplug the black cable [2] going from the IBO zapper/SSB to the Audio/STBY board.
4. Remove all other cables [3] from the IBO zapper/SSB.
5. Remove the fixation screws [4] that connect the top shielding with the bottom shielding.
6. Remove the fixation screws [5] that connect the connector plate to the frame.
7. Remove the fixation screws [6] that connect the shield to the rear connector plate, see Figure "Connector screws".
8. Remove the fixation screws [7] from the connectors.
9. Remove the connector plate from the shielding.
10. Remove the upper part of the shield (with the IBO zapper attached to it) from the lower part of the shield (on which the SSB is located), by unhooking it from its brackets.
11. Disconnect the antenna connector [8] from the tuner, see Figure "IBO zapper & SSB".

12. Carefully unlock the locking mechanism of the FFC connector [9] and remove the flatfoil cable (see Figure "How to unlock an FFC connector").
13. Finally, loosen four screws [10], and remove the IBO zapper from the top shielding.



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Figure 4-3 IBO-zapper & SSB



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021105

Figure 4-4 How to unlock an FFC connector

### 4.2 Set Re-assembly

To re-assemble the whole set, execute all processes in reverse order.

### Notes:

- While re-assembling, make sure that all cables are placed and connected in their original positions. Be careful with the fragile LVDS cable.

## 5. Service Modes, Error Codes, and Fault Finding

### Index of this chapter:

- 5.1 Service Modes
- 5.2 Error Codes

#### Notes:

- Only information that is related to the IBO Zapper module is published in this manual. For the other information, see the relevant chassis manual (order code on front page).

### 5.1 Service Modes

#### 5.1.1 Digital Customer Service Mode (DCSM)

##### Purpose

The Digital Customer Service Mode shows error codes and information on the IBO Zapper module operation settings. The call centre can instruct the customer to activate DCSM by telephone and read off the information displayed. This helps the call centre to diagnose problems and failures in the IBO Zapper module before making a service call.

The DCSM is a read-only mode; therefore, modifications are not possible in this mode.

##### How to Activate

To activate the DCSM, put the television in its digital mode (via the A/D button on the remote control).

- Press the "Digital" Menu button on the remote control to activate the digital user menu ("Setup").
- Activate the "Information" sub menu (via the "down" and "right" cursor buttons).
- In the "Information" sub menu, press the following buttons on the remote control to activate the DCSM: **"GREEN RED YELLOW 9 7 5 9"**. Then, the "Service menu" will appear (see figures below).

##### Menu explanation

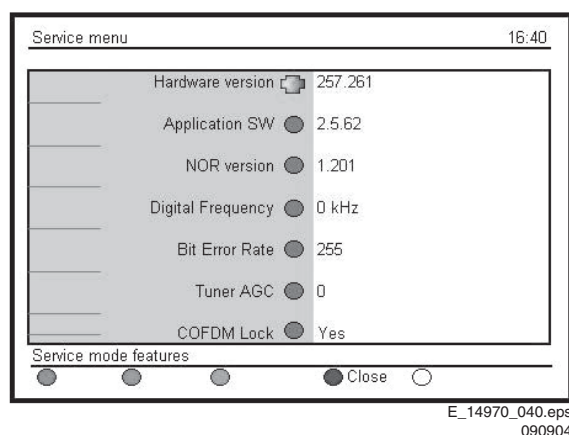


Figure 5-1 DCSM menu - 1

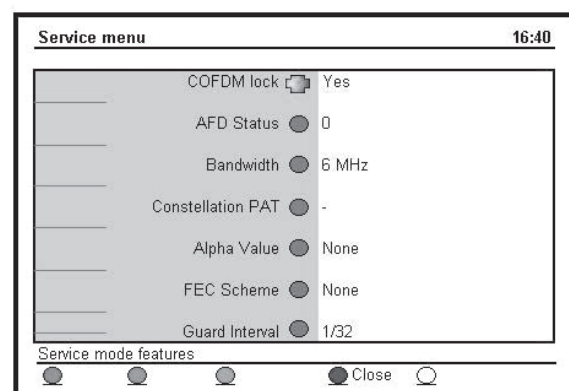


Figure 5-2 DCSM menu - 2

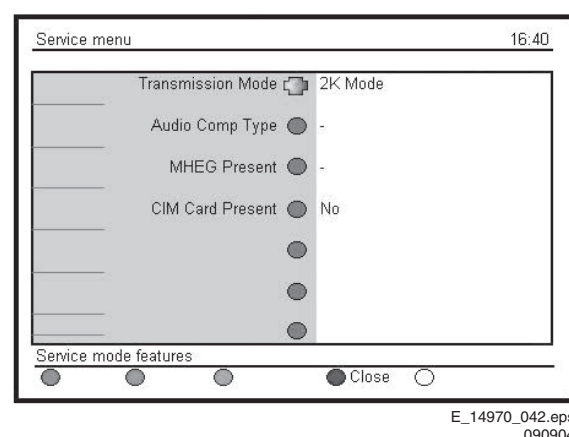


Figure 5-3 DCSM menu - 3

- Hardware version:** This indicates the version of the IBO Zapper module hardware.
- Application SW:** The application software version.
- NOR Version:** The NOR Flash image software version
- Digital Frequency:** The digital frequency that the set is tuned to.
- Bit Error Rate:** The error rate measured before the error correction algorithm circuitry. (this value gives an impression of the received signal)
- Tuner AGC:** Tuner AGC value.
- COFDM Lock:** Indication if COFDM decoder is locked.
- AFD Status:** Status of the Active Picture Format Descriptor.
- Terrestrial Delivery System Parameters:**
  - Bandwidth:** Bandwidth of the received signal.
  - Constellation Pattern:** Displays the signal constellation.
  - Alpha Value:** Displays the Alpha Value.
  - FEC Scheme:** Displays the Forward Error Correcting Scheme
  - Guard Interval:** Displays the value for the Guard Interval.
  - Transmission Mode:** Displays the Transmission Mode.
- Audio Comp Type:** Type of detected audio stream.
- MHEG Present:** Indicates if MHEG is present or not.
- CIM Card Present:** Indicates if CIM card is present or not.

##### How to exit

Press the **BLUE** button on the Remote Control to exit DCSM.

## 5.2 Error Codes

The error code buffer contains all errors detected since the last time the buffer was erased. The buffer is written from left to right. When an error occurs that is not yet in the error code buffer, it is displayed at the left side and all other errors shift one position to the right.

### 5.2.1 How to Read the Error Buffer

You can read the error buffer in 3 ways:

- On screen via the SAM (if you have a picture).

#### Examples:

- ERROR: 0 0 0 0 0 : No errors detected
- ERROR: 6 0 0 0 0 : Error code 6 is the last and only detected error
- ERROR: 9 6 0 0 0 : Error code 6 was detected first and error code 9 is the last detected (newest) error
- Via the blinking LED procedure (when you have no picture). See "The Blinking LED Procedure".
- Via ComPair.

### 5.2.2 How to Clear the Error Buffer

The error code buffer is cleared in the following cases:

- By using the CLEAR command in the SAM menu:
  - To enter SAM, press the following key sequence on the remote control transmitter: **"062596"** directly followed by the OSD/i+ button (do not allow the display to time out between entries while keying the sequence).
  - Make sure the menu item CLEAR is selected. Use the MENU UP/DOWN buttons, if necessary.
  - Press the MENU RIGHT button to clear the error buffer. The text on the right side of the "CLEAR" line will change from "CLEAR?" to "CLEARED"
- If the contents of the error buffer have not changed for 50 hours, the error buffer resets automatically.

**Note:** If you exit SAM by disconnecting the mains from the television set, the error buffer is not reset.

### 5.2.3 Error Codes

In case of non-intermittent faults, write down the errors present in the error buffer and clear the error buffer before you begin the repair. This ensures that old error codes are no longer present.

If possible, check the entire contents of the error buffer. In some situations, an error code is only the result of another error and not the actual cause of the problem (for example, a fault in the protection detection circuitry can also lead to a protection).

Table 5-1 Error code overview

Error	Error Description	Check Item	Diagram
0	No Error		
1	Mis-match of TV (Hercules) SW and Scaler SW	Software versions	N.A.
2	+12V from PSU error	PSU	A
3	Plasma I <sup>2</sup> C error (only for plasma sets)	N.A.	N.A.
4	I <sup>2</sup> C error while communicating with the Genesis Scaler	7801	B7 + B8
5	+5V protection	7752	B6
6	General I <sup>2</sup> C error; communication between ADC, analogue tuner, and/or Columbus I <sup>2</sup> C failed	1102, 7L01, 7M00	B1 + B18 + B19
7	I <sup>2</sup> C error while communicating with ADC	7L01	B18
8	I <sup>2</sup> C error while communicating with the Scaler EEPROM	7C01	B11
9	I <sup>2</sup> C error while communicating with the Hercules EEPROM (NVM for TV). <b>Remark:</b> when the Hercules EEPROM is defective, the Hercules should operate with its default values.	7207	B2
10	I <sup>2</sup> C error while communicating with the PLL tuner	1102	B1
11	I <sup>2</sup> C error while communicating with the 3D combfilter IC-7M00 (Columbus)	7M00	B19
12	I <sup>2</sup> C error while communicating with iBoard uP (only iTV sets)	N.A.	N.A.
13	I <sup>2</sup> C error while communicating with the HDMI decoder IC-7D03 (only for NAFTA and AP)	N.A.	N.A.
14	Read-write error with the Scaler SDRAM	7B01	B10
15	I <sup>2</sup> C error while communicating with the OTC	7001	T
16	I <sup>2</sup> C error while communicating with EPLD or Pacific III	7N00	B20 + B21
17	I <sup>2</sup> C error while communicating with the Digital Module (only for digital sets)	7100	K1

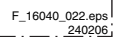








## A2 FILTERS STANDBY

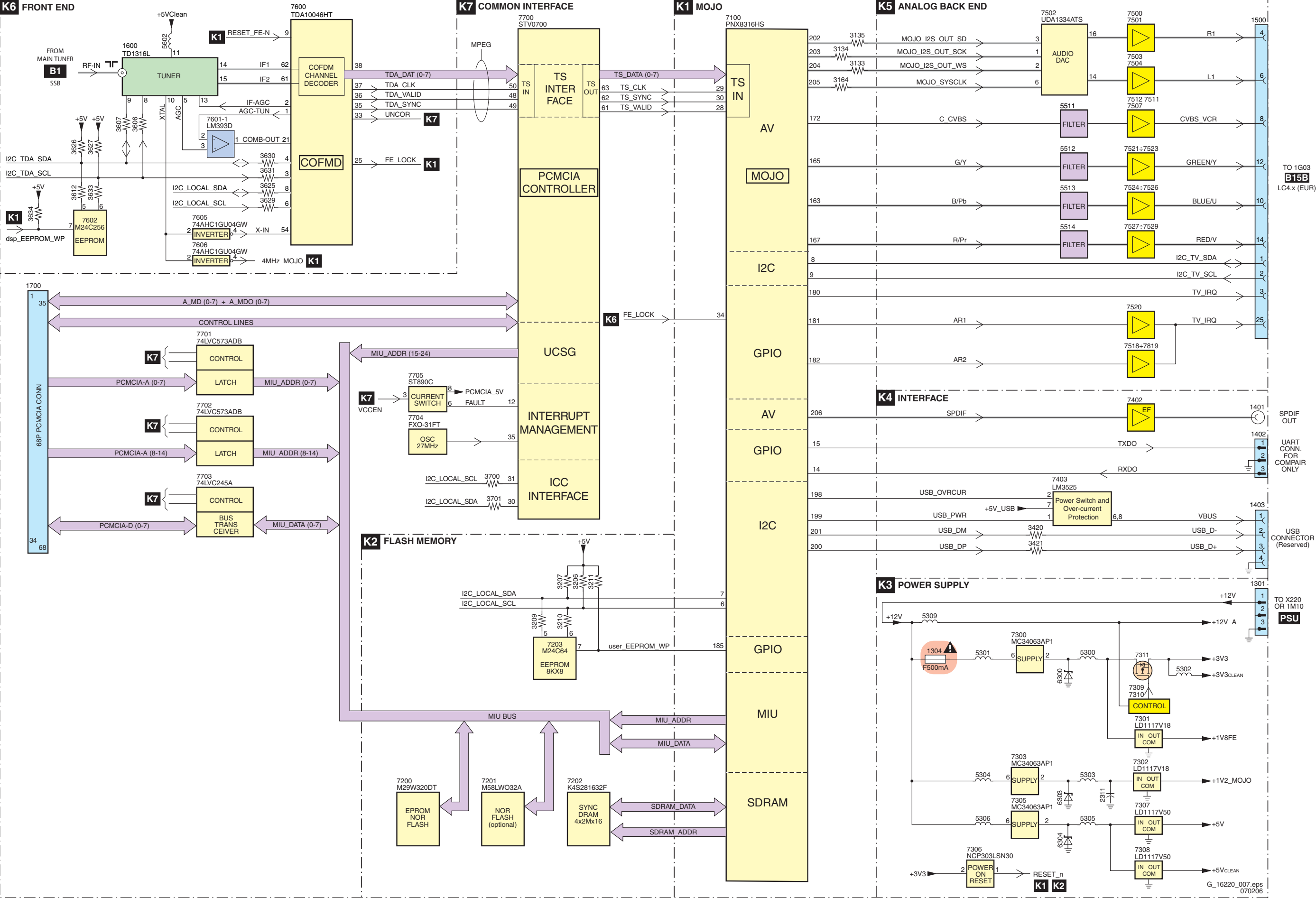




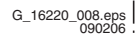


Block Diagram IBO Zapper

IBO - ZAPPER 2 PANEL (DVB)

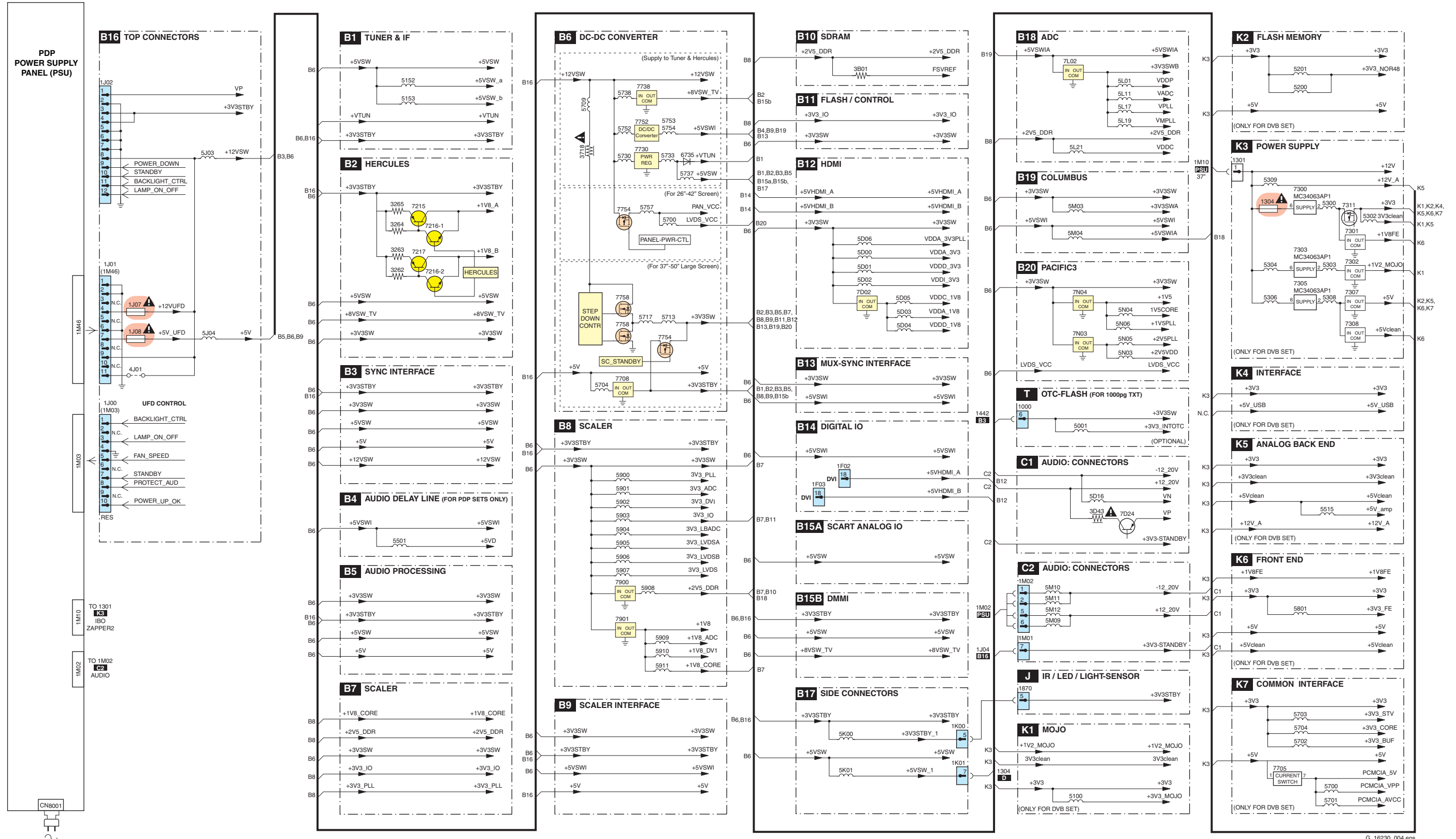


**I<sup>2</sup>C**

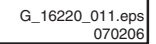




## SUPPLY LINE OVERVIEW



## IBO Zapper Panel: MOJO

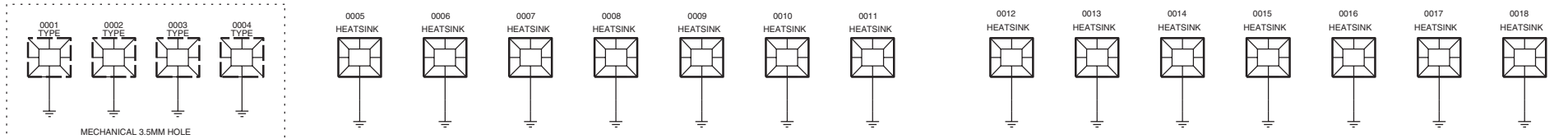
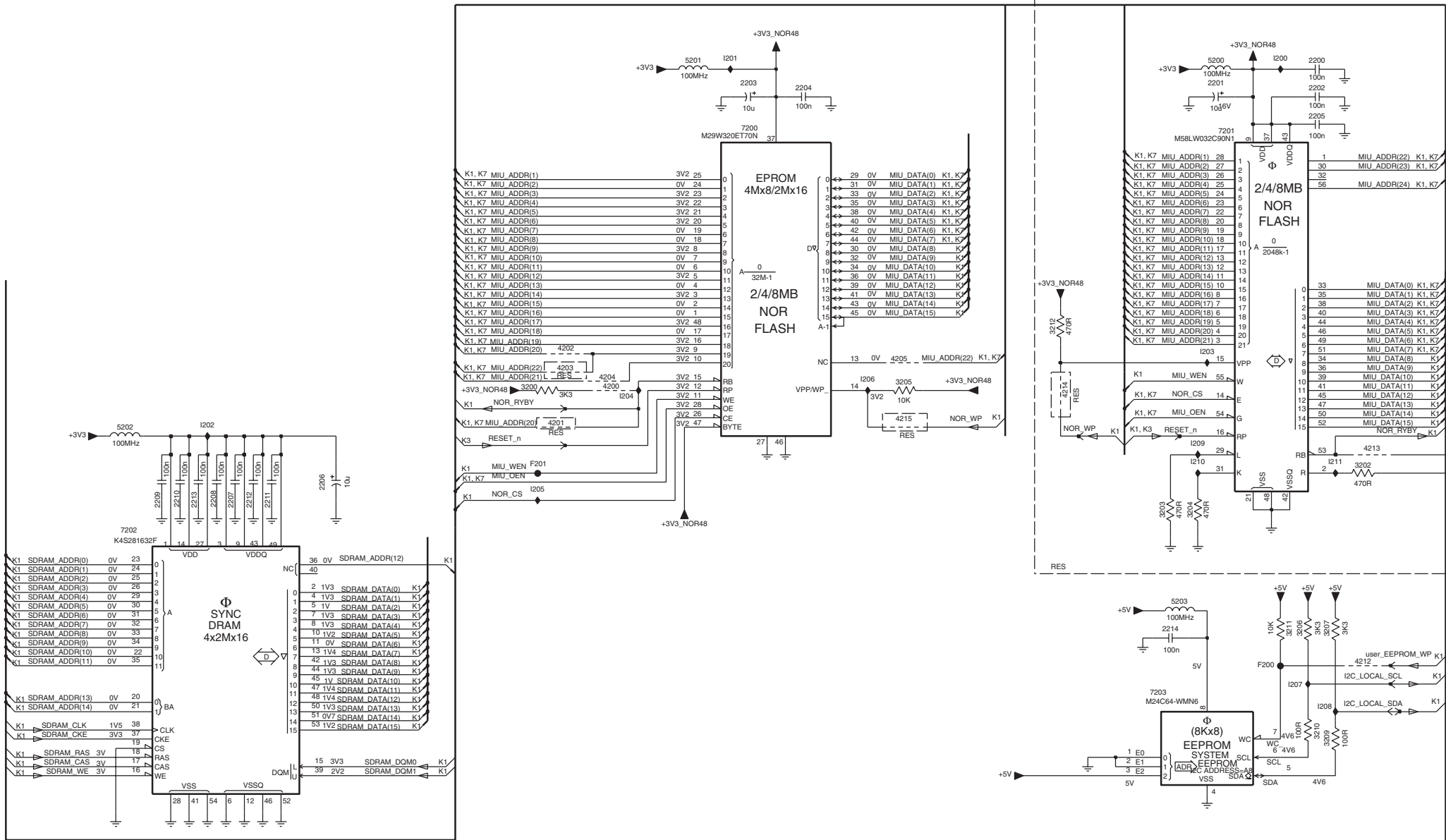




IBO Zapper Panel: Flash Memory

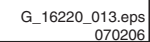
K2 FLASH MEMORY

K2



0001 H1  
0002 H2  
0003 H2  
0004 H2  
0005 H3  
0006 H4  
0007 H4  
0008 H5  
0009 H5  
0010 H6  
0011 H6  
0012 H7  
0013 H8  
0014 H9  
0015 H9  
0016 H10  
0017 H10  
0018 H11  
2200 B13  
2201 B12  
2202 B13  
2203 B8  
2204 B9  
2205 B13  
2206 E5  
2207 E4  
2208 E4  
2209 E4  
2210 E4  
2211 E4  
2212 E4  
2213 E4  
2214 F11  
3200 D6  
3201 D14  
3202 E13  
3203 E11  
3204 E12  
3205 D9  
3206 F12  
3207 F13  
3209 G13  
3210 G13  
3211 F12  
3212 D11  
4200 D7  
4201 D7  
4202 D7  
4203 D7  
4204 D7  
4205 D9  
4212 F13  
4213 E13  
4214 D11  
4215 D9  
5200 B12  
5201 B8  
5202 D3  
5203 F12  
7200 B8  
7201 B12  
7202 E3  
7203 G11  
F200 F12  
F201 E7  
I200 B12  
I201 B8  
I202 D4  
I203 D12  
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I206 D9  
I207 F12  
I208 G13  
I209 E12  
I210 E12  
I211 E13

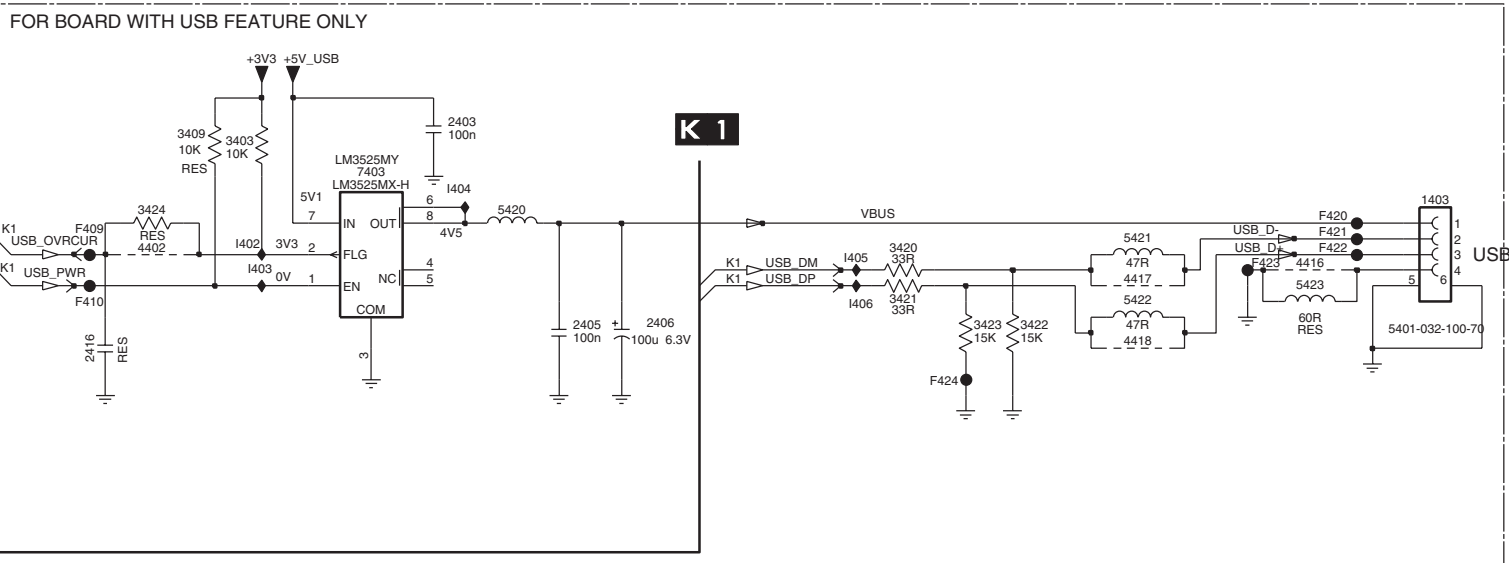
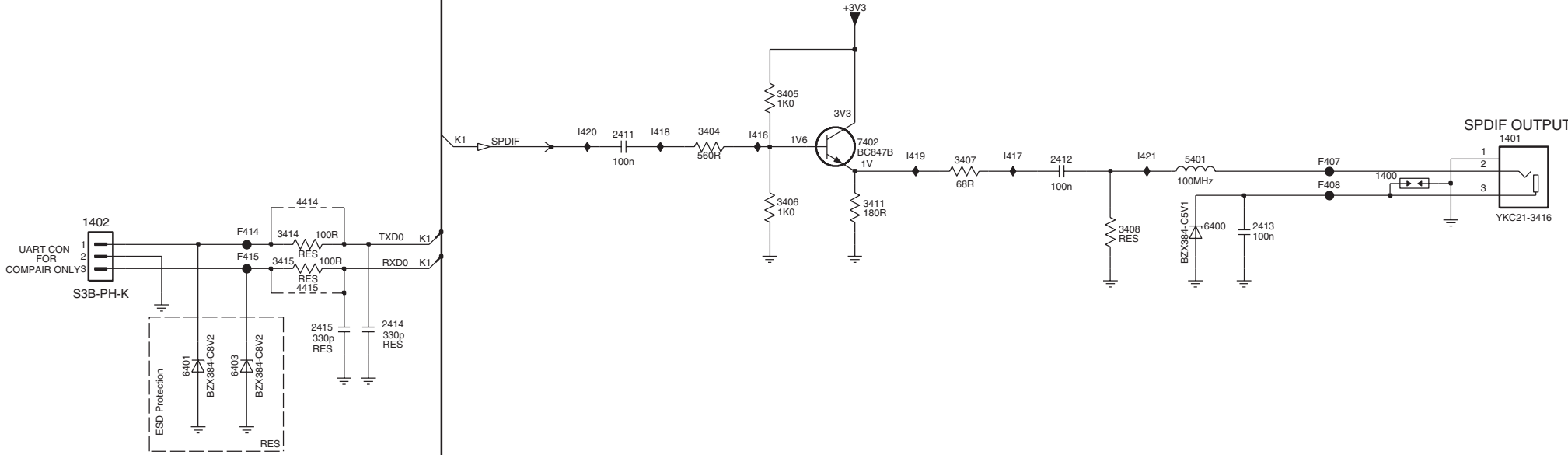
## K3 POWER SUPPLY



IBO Zapper Panel: Interface

K4 INTERFACE

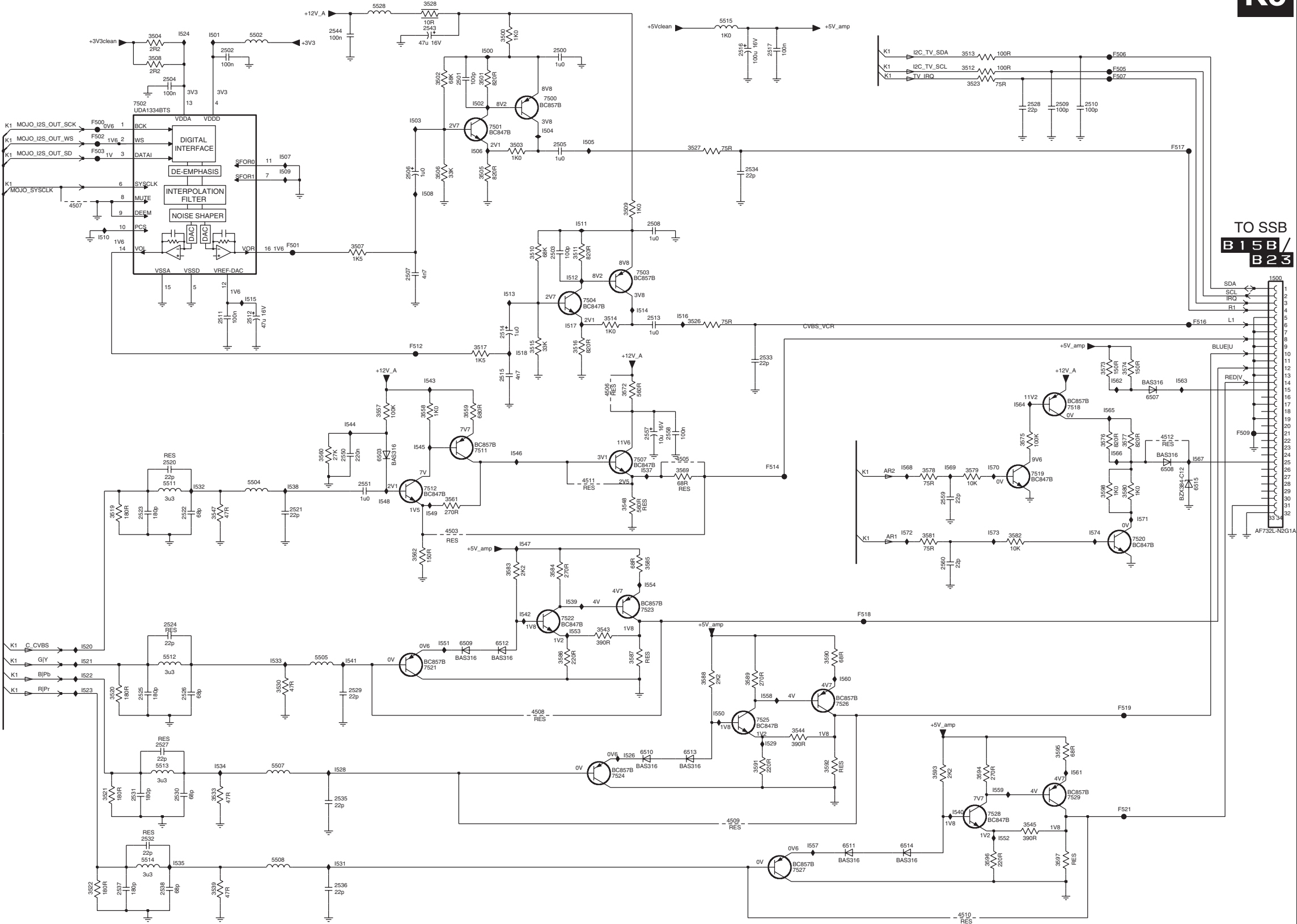
K4



IBO Zapper Panel: Analog Back End

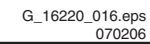
K5 ANALOG BACK END

K5



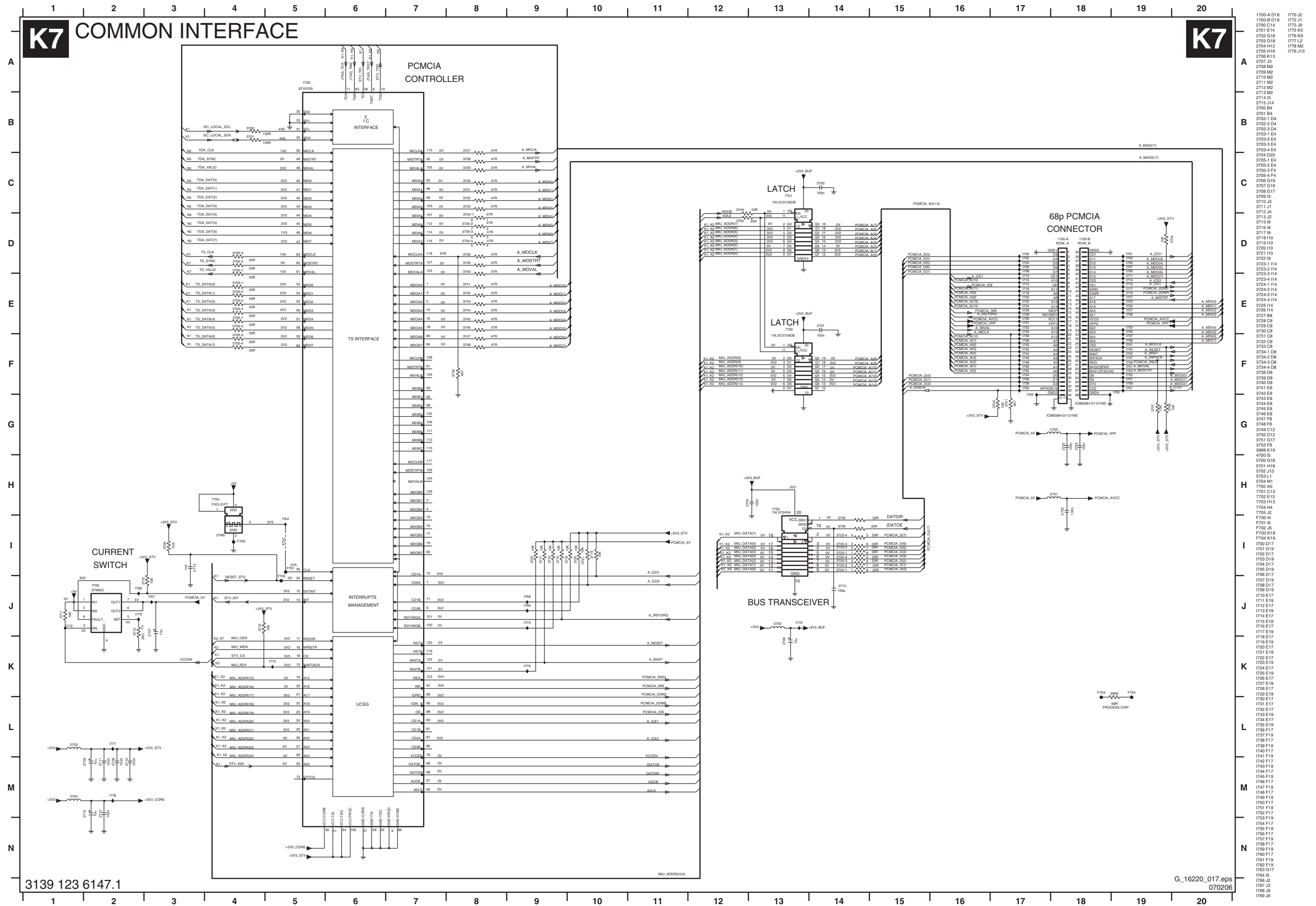
1500 C13	4506 D7	1560 G9
2500 A7	4507 B2	1561 H12
2501 A6	4508 H6	1562 D12
2502 A3	4509 I8	1563 D13
2503 C7	4510 I11	1564 D11
2504 A3	4511 E7	1565 E12
2505 B7	4512 E13	1566 E12
2506 B5	4502 A4	1567 E13
2507 C5	4504 E4	1568 E10
2508 C8	4505 G4	1569 E11
2509 A12	4507 H4	1570 E11
2510 A12	4508 I4	1571 F12
2511 D3	4511 E3	1572 F10
2512 D4	4512 G3	1573 F11
2513 D8	4513 H3	1574 F12
2514 D6	4514 I3	
2515 D6	4515 A8	
2516 A8	4528 A5	
2517 A9	4503 E5	
2520 E3	4507 D13	
2521 F4	4508 E13	
2522 F3	4509 G6	
2523 F3	4510 H8	
2524 G3	4511 I10	
2525 G3	4512 G6	
2526 G3	4513 H8	
2527 H3	4514 I10	
2528 A11	4515 E13	
2529 G5	4500 A7	
2530 H3	4501 B6	
2531 H2	4502 A3	
2532 I3	4503 C7	
2533 D9	4504 C7	
2534 B9	4507 E7	
2535 H4	4511 E6	
2536 I4	4512 E5	
2537 I2	4518 D12	
2538 I3	4519 E11	
2543 A5	4520 F12	
2544 A4	4521 G5	
2550 E5	4522 G7	
2551 E5	4523 F7	
2557 E8	4524 H7	
2558 E8	4525 H9	
2559 E10	4526 G9	
2560 F10	4527 I9	
3500 A6	4528 I11	
3501 A6	4529 H12	
3502 A5	4500 B2	
3503 B6	4501 C4	
3504 A3	4502 B2	
3505 B6	4503 B2	
3506 B5	4505 A12	
3507 C5	4506 A12	
3508 A3	4507 A12	
3509 C7	4509 E13	
3510 C6	4512 D5	
3511 C7	4514 E9	
3512 A11	4516 D13	
3513 A11	4517 B13	
3514 D7	4518 G10	
3515 D6	4519 G12	
3516 D7	4521 H12	
3517 D6	4500 A6	
3519 F2	4501 A3	
3520 G2	4502 A6	
3521 H2	4503 B5	
3522 I2	4504 B7	
3523 A11	4505 B7	
3526 D8	4506 B6	
3527 B8	4507 B4	
3528 A5	4508 B5	
3530 G4	4509 B4	
3533 H3	4510 C2	
3539 I3	4511 C7	
3543 G7	4512 C7	
3544 H9	4513 C6	
3545 I11	4514 D7	
3547 F3	4515 C4	
3548 E7	4516 D8	
3557 E5	4517 D7	
3558 E5	4518 D6	
3559 E6	4520 G2	
3560 E4	4521 G2	
3561 E6	4522 G2	
3562 F5	4523 G2	
3569 E8	4524 A3	
3572 D7	4526 H7	
3573 D12	4528 H4	
3574 D12	4529 H9	
3575 E11	4531 I4	
3576 E12	4532 E3	
3577 E12	4533 G4	
3578 E10	4534 H3	
3579 E11	4535 I3	
3580 E12	4537 E8	
3581 F10	4538 E4	
3582 F11	4539 F7	
3583 F6	4540 H11	
3584 F7	4541 G5	
3585 F8	4542 G6	
3586 G7	4543 D5	
3587 G7	4544 E5	
3588 G8	4545 E5	
3589 G8	4546 E6	
3590 G9	4547 F6	
3591 H9	4548 E5	
3592 H9	4549 F5	
3593 H10	4550 H8	
3594 H11	4551 G5	
3595 H12	4552 I11	
3596 I11	4553 G7	
3597 I12	4554 F8	
3598 E12	4557 I9	
4503 F6	4558 G9	
4505 E8	4559 H11	

## K6 FRONT END

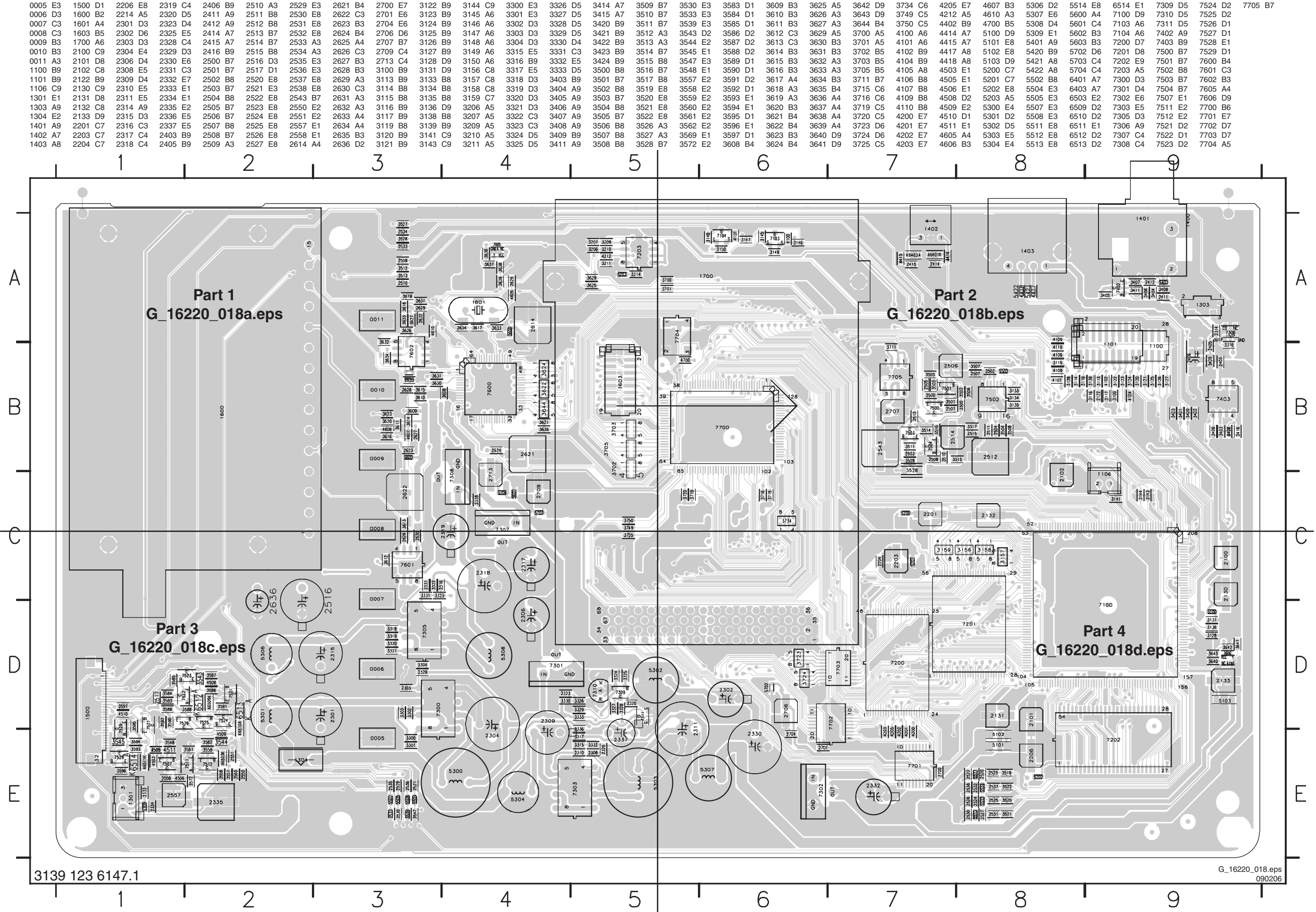




## IBO Zapper Panel: Common Interface

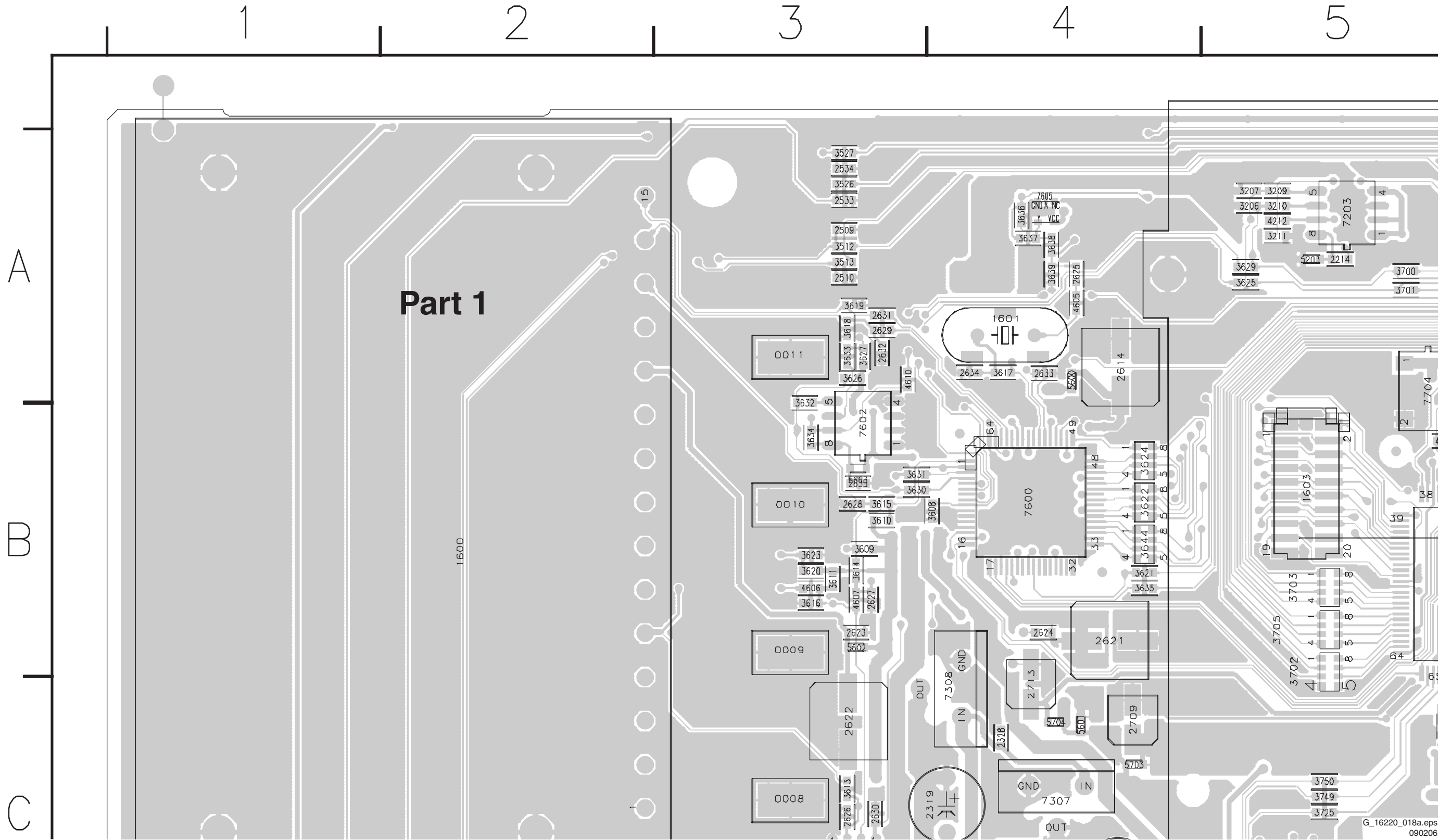


Layout IBO Zapper Panel (Overview Top Side)

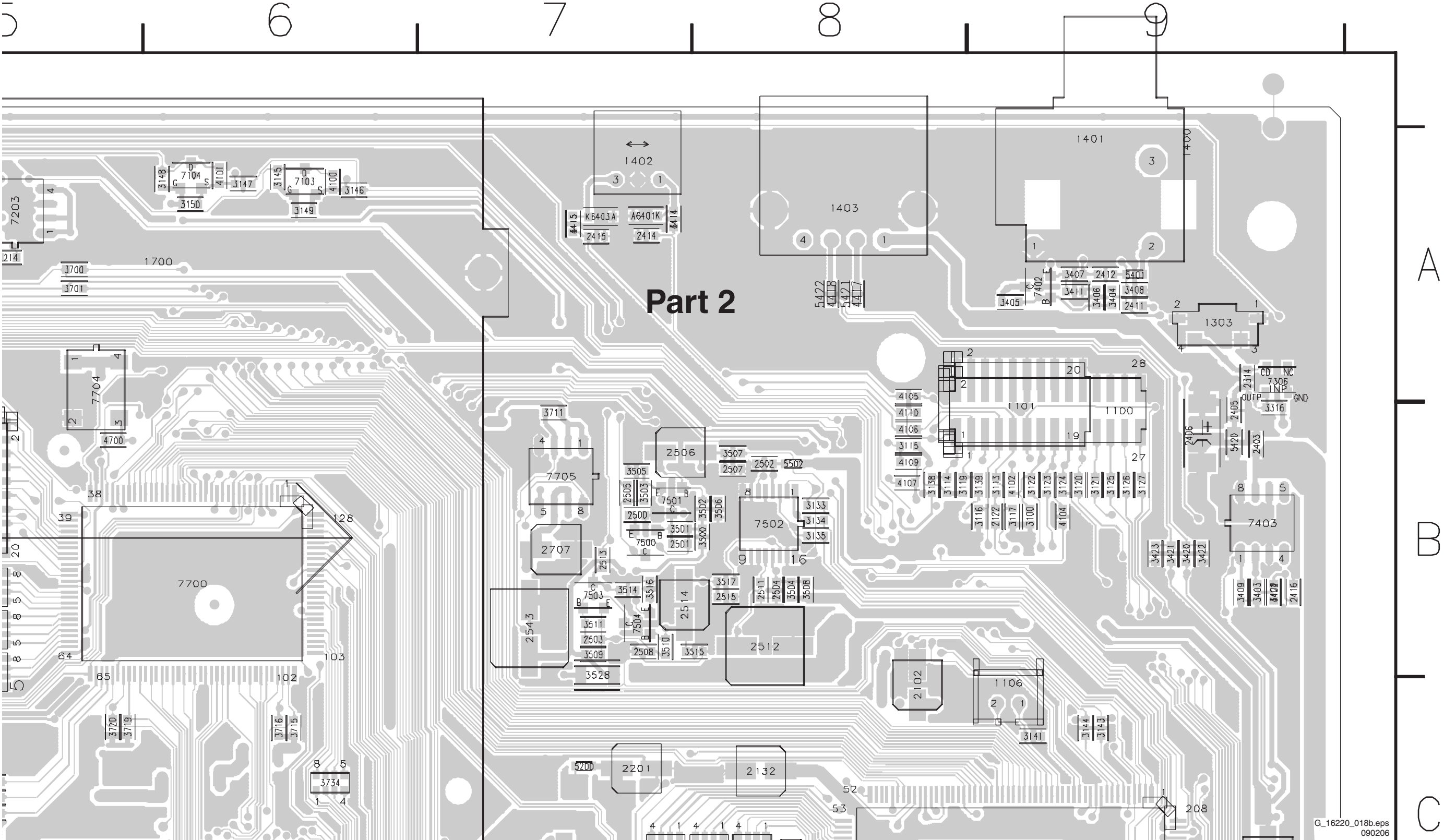




Layout IBO Zapper Panel (Part 1 Top Side)



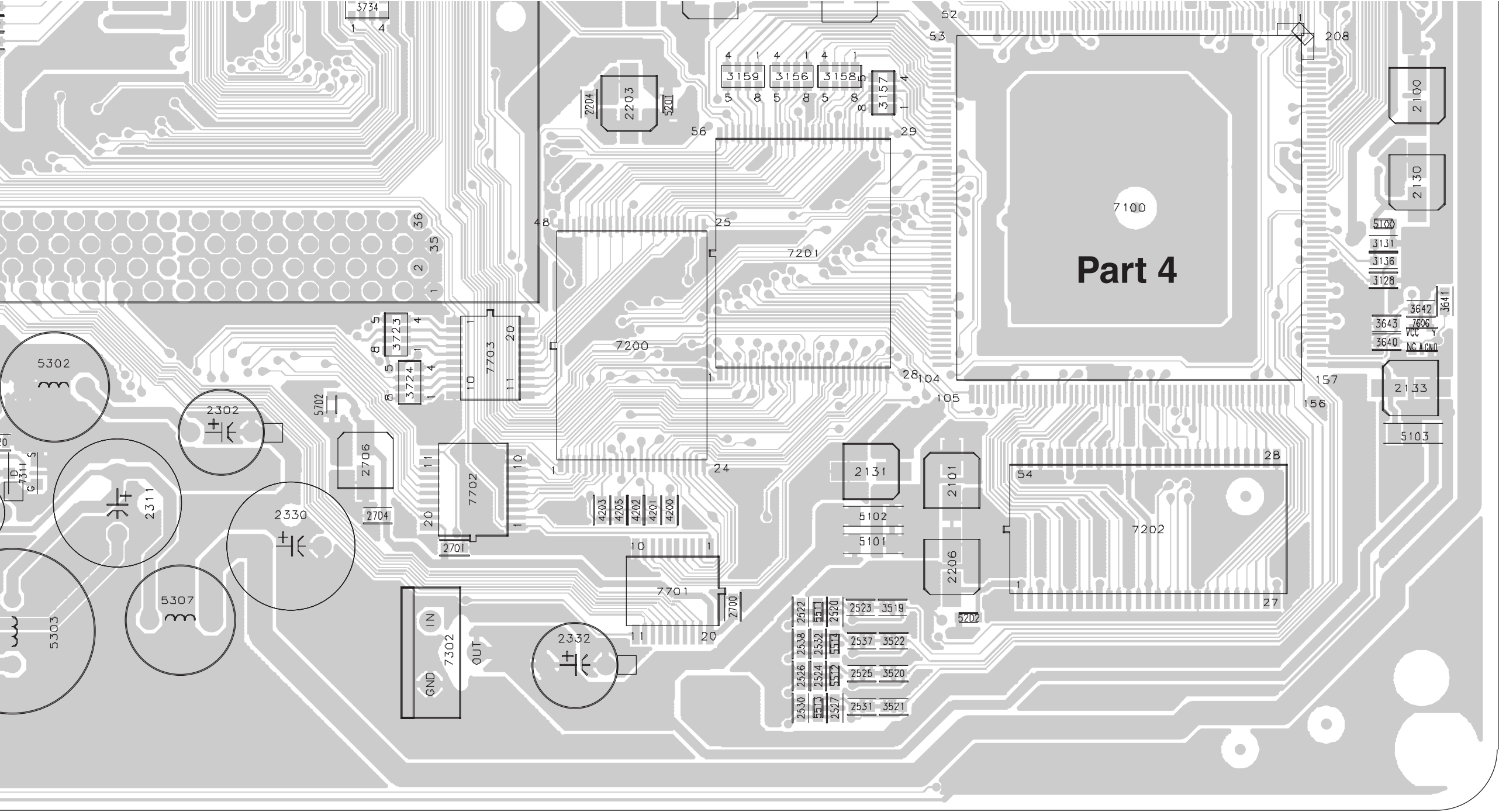
Layout IBO Zapper Panel (Part 2 Top Side)



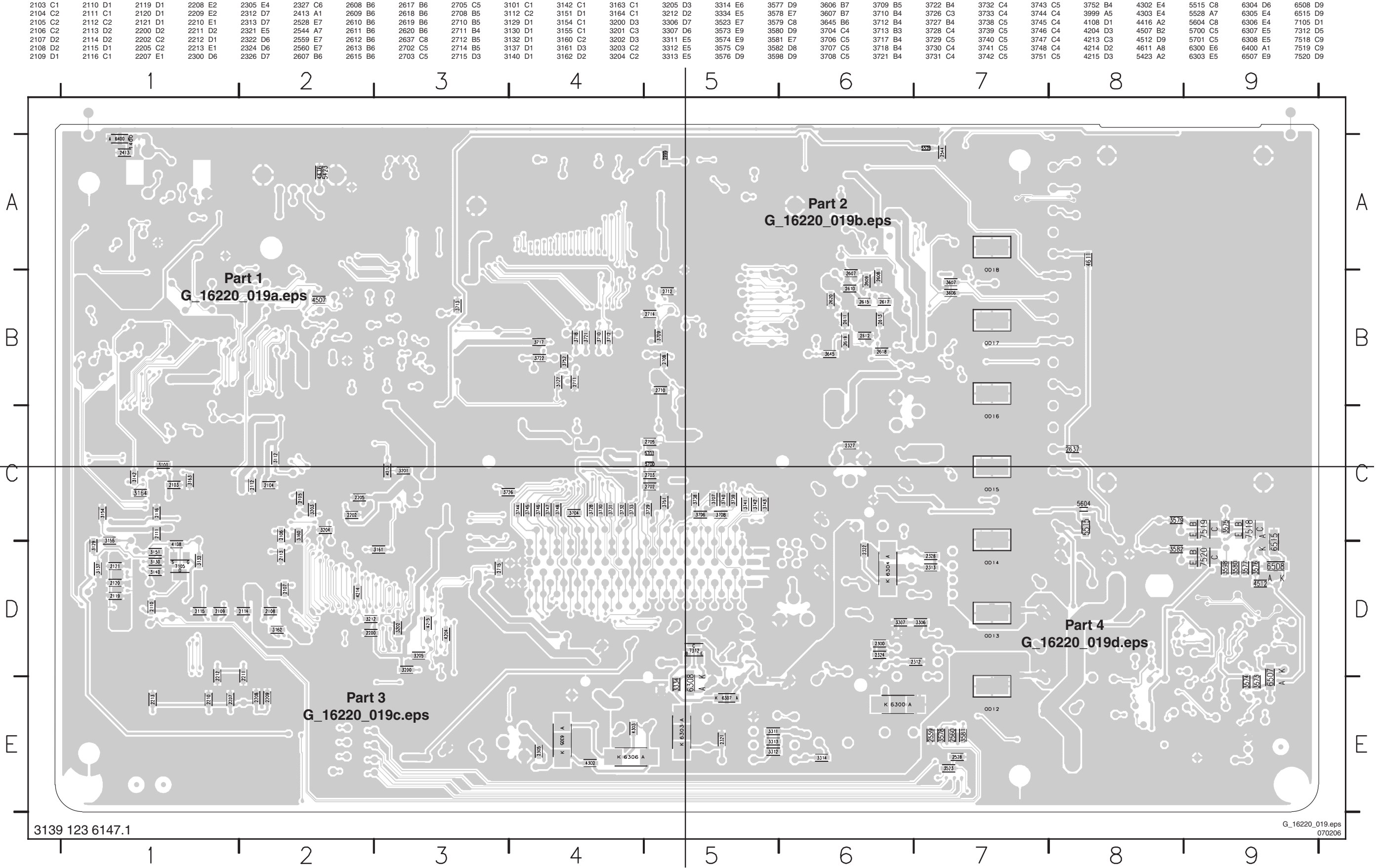
## E



Layout IBO Zapper Panel (Part 4 Top Side)

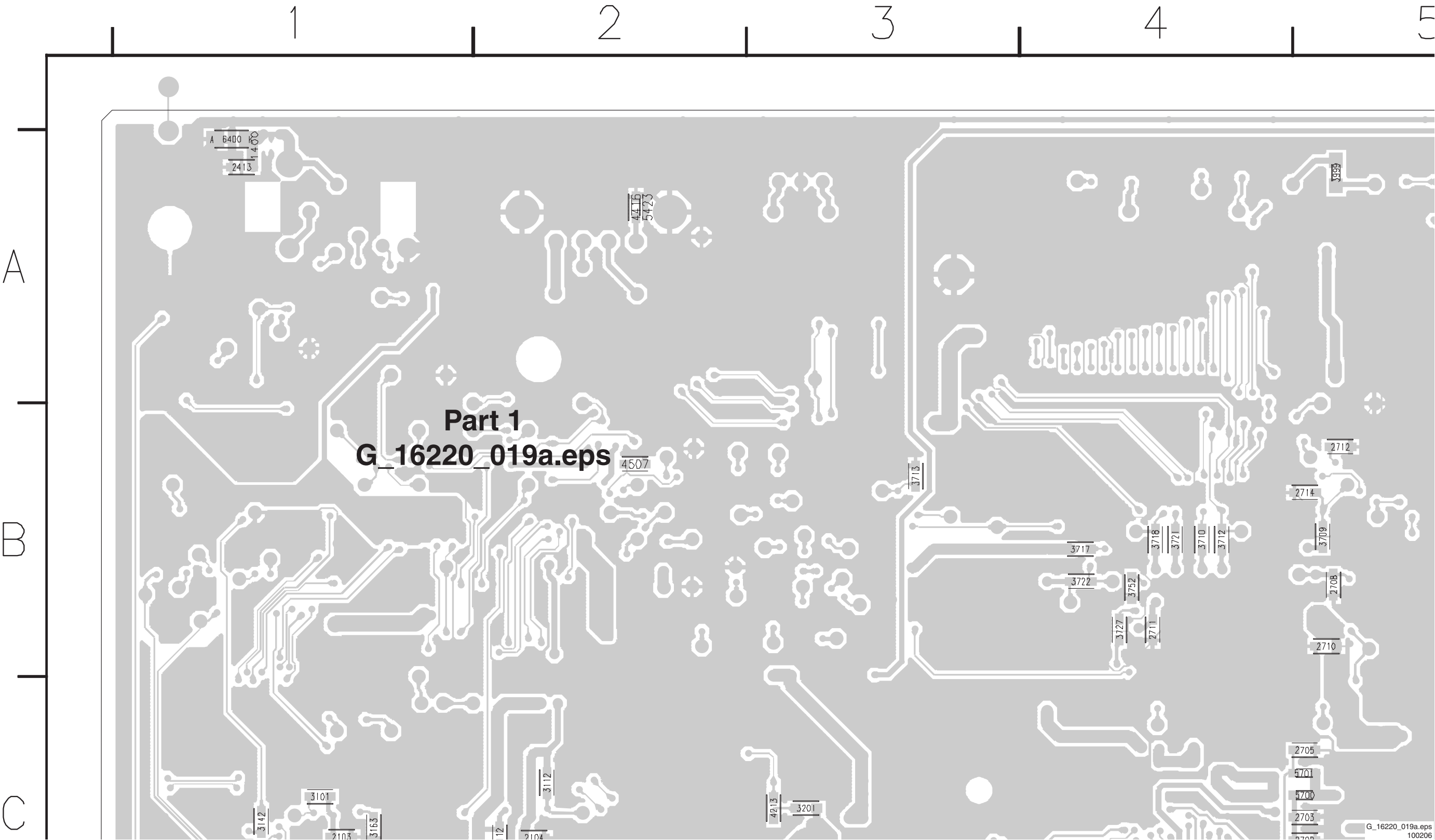


Layout IBO Zapper Panel (Overview Bottom Side)

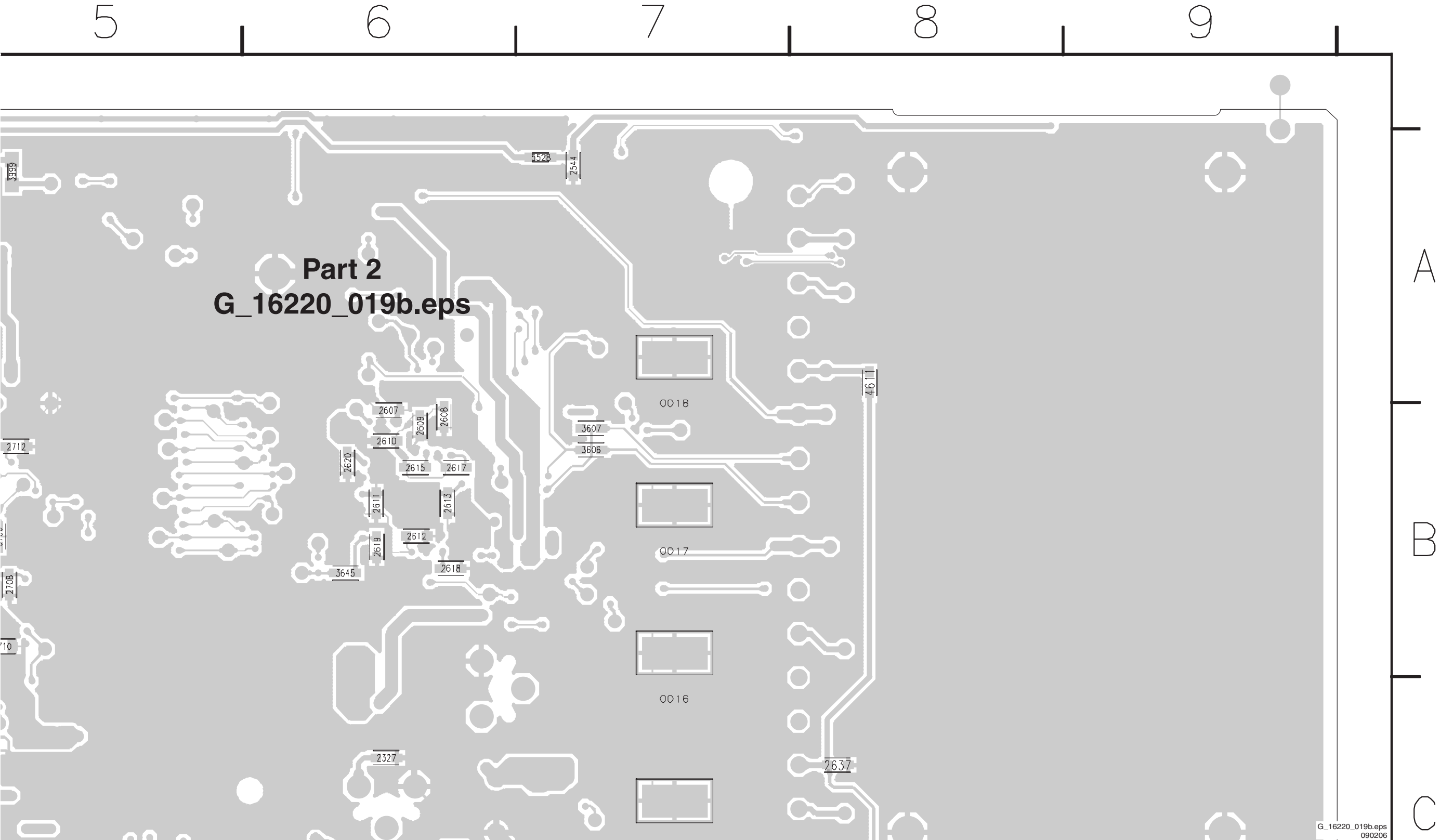




Layout IBO Zapper Panel (Part 1 Bottom Side)

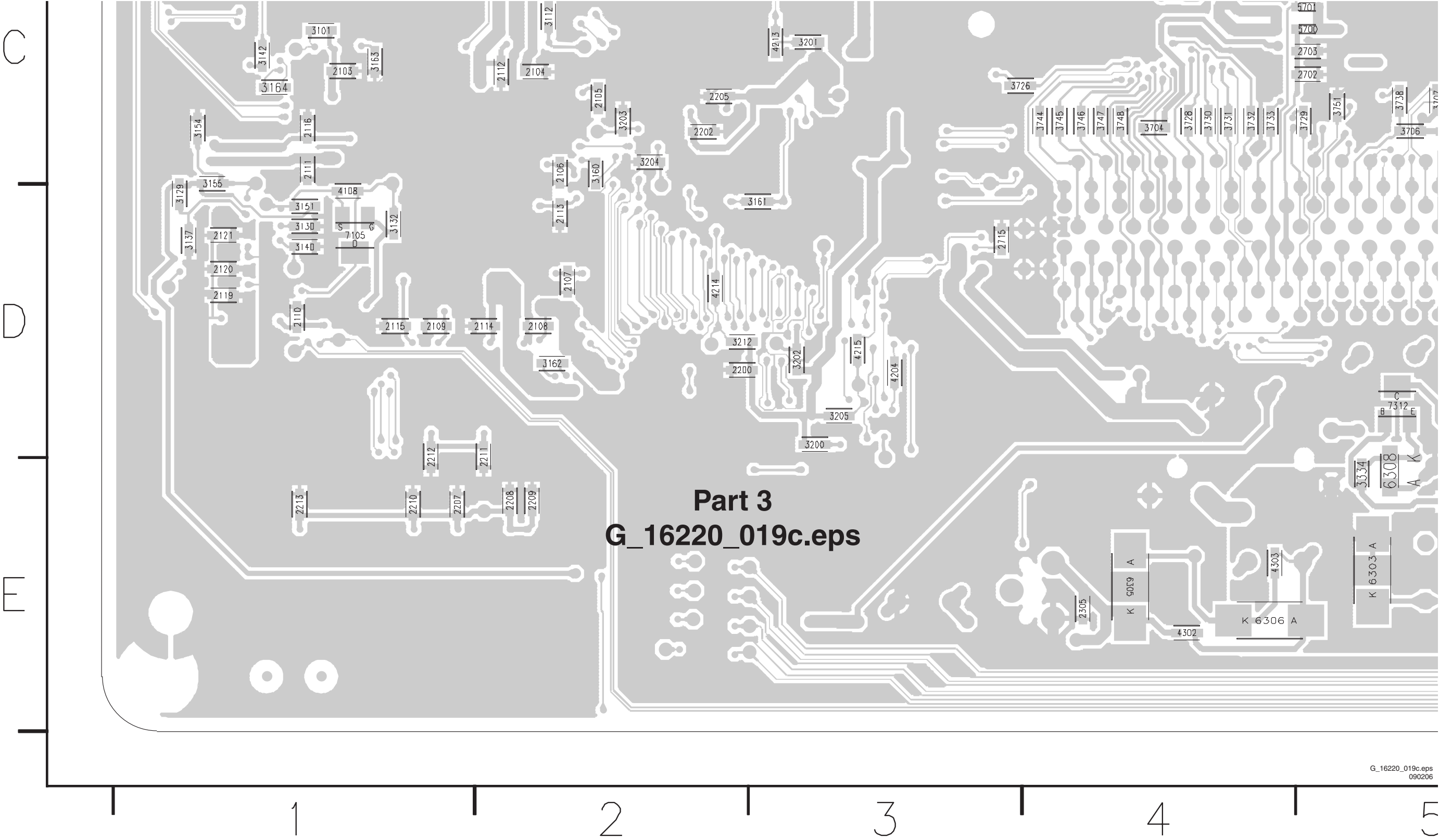


Layout IBO Zapper Panel (Part 2 Bottom Side)

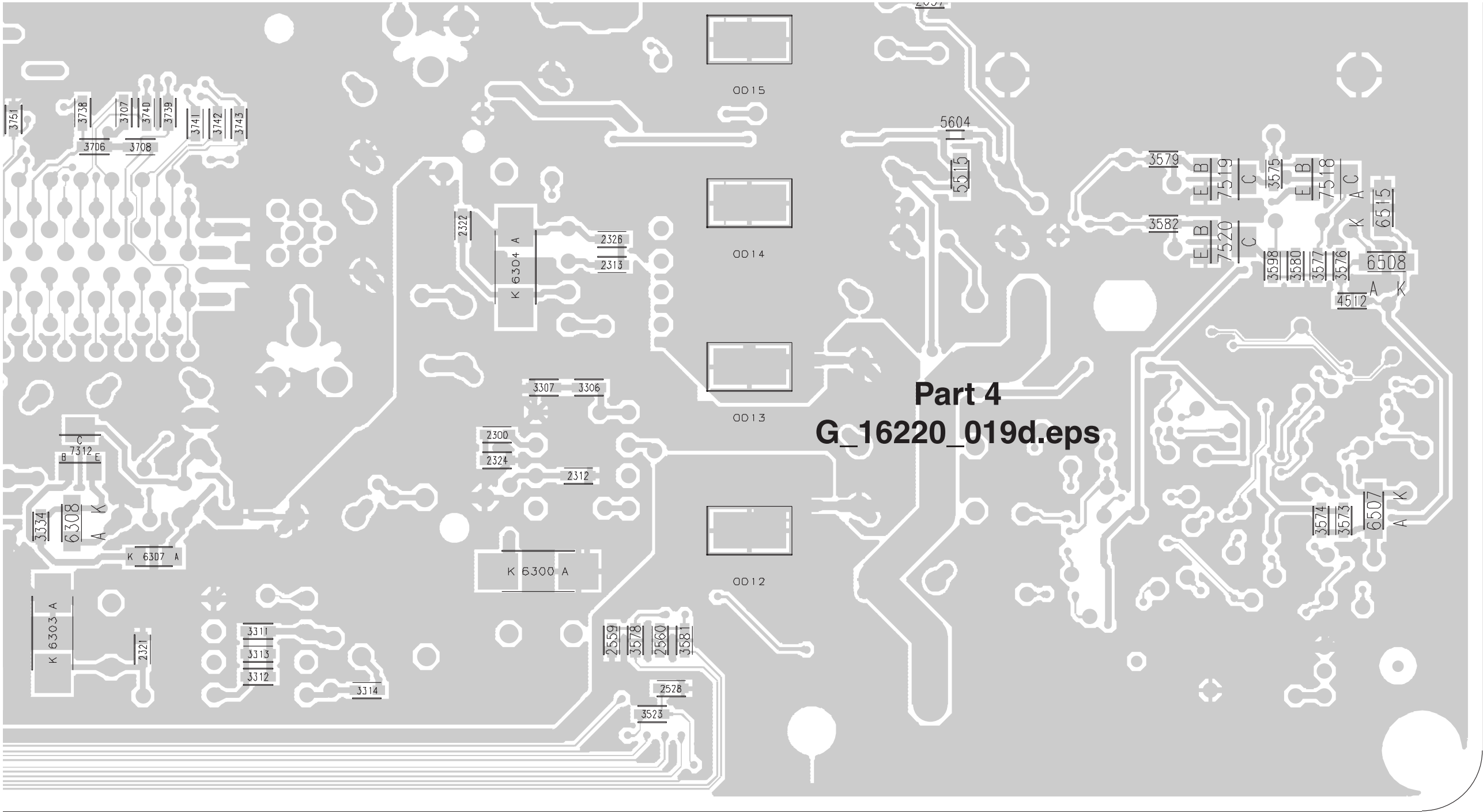




Layout IBO Zapper Panel (Part 3 Bottom Side)



Layout IBO Zapper Panel (Part 4 Bottom Side)



C

D

E

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[illegible]

## 8. Alignments

### Index of this chapter:

- 8.1 General Alignment Conditions
- 8.2 Hardware Alignments
- 8.3 Software Alignments

**Note:** Figures below can deviate slightly from the actual situation, due to the different set executions.

### 8.1 General Alignment Conditions

Perform all electrical adjustments under the following conditions:  
 Mains voltage and frequency: 220-240 V / 50/60 Hz.  
 Allow the set to warm up for approximately 10 minutes.  
 Test probe: Ri > 10 MΩ; Ci < 2.5 pF.

### 8.2 Hardware Alignments

There are no hardware alignments foreseen for the IBO Zapper module.

### 8.3 Software Alignments

With the software alignments of the Service Alignment Mode (SAM) the geometry, white tone and tuner (IF) can be aligned. To store the data: Use the RC button Menu to switch to the main menu and next, switch to 'Stand-by' mode.

#### 8.3.1 ADC Gain and Grey Scale Alignment

The table below shows a number of NVM settings used for each model of TV set. Be sure to use the correct editor in the SAM menu (NVM Editor or SC NVM Editor), because the first one is used for the Hercules NVM, and the second one for the SCALER (SC) part of the TV set.

#### Caution:

- **Do not change the NVM settings without understanding the function of each setting, because incorrect NVM settings may seriously hamper the correct functioning of the TV set!**
- **Do not change the Scaler NVM settings, as this will hamper the DVI / HDMI functionality of the TV set!**
- Always note down the existing NVM settings, before changing the settings. This will enable you to return to the original settings, if the new settings turn out to be incorrect.

Table 8-1 ADC gain and grey scale alignment

SDTV ADC Gain settings: Use the NVM Editor in SAM to set these values in the Hercules NVM		
Setting	Hercules NVM Address (decimal value)	42PF5521D/10/12 42PF7521D/10/12 50PF7521D/10 (TBD)
NVM_ADC_GAIN_R	006	135
NVM_ADC_GAIN_G	007	185
NVM_ADC_GAIN_B	008	165

SDTV Greyscale settings: Use the SC NVM Editor in SAM to set these values in the Scaler NVM		
Setting	Scaler NVM Address (decimal value)	42PF5521D/10/12 42PF7521D/10/12 50PF7521D/10 (TBD)
ADC_RED_OFFSET2	338	070
ADC_GRN_OFFSET2	339	070
ADC_BLU_OFFSET2	340	070
ADC_RED_GAIN	341	150
ADC_GRN_GAIN	343	150
ADC_BLU_GAIN	345	150
PC Greyscale settings		
Setting	Scaler NVM Address (decimal value)	42PF5521D/10/12 42PF7521D/10/12 50PF7521D/10 (TBD)
ADC_RED_OFFSET2	325	070
ADC_GRN_OFFSET2	326	070
ADC_BLU_OFFSET2	327	070
ADC_RED_GAIN	328	240
ADC_GRN_GAIN	330	240
ADC_BLU_GAIN	332	240
HD Greyscale settings		
Setting	Scaler NVM Address (decimal value)	42PF5521D/10/12 42PF7521D/10/12 50PF7521D/10 (TBD)
ADC_RED_OFFSET2	351	064
ADC_GRN_OFFSET2	352	075
ADC_BLU_OFFSET2	353	064
ADC_RED_GAIN	354	180
ADC_GRN_GAIN	356	180
ADC_BLU_GAIN	358	180

8.3.2 Panel Size Settings

The table below shows the NVM settings for panel selection, based on panel size and manufacturer. Use the SC NVM editor in the SAM menu to change the panel code at decimal address 320.

Caution:

- **Make sure to choose the right panel, because incorrect NVM settings may seriously hamper the correct functioning of the TV set!**
- Always note down the existing NVM settings, before changing the settings. This will enable you to return to the original settings, if the new settings turn out to be incorrect.

Table 8-2 Panel size settings

Option table for panel size settings		
Manufacturer	Size (inch)	Panel code (hex)
SDI	42	02
FHP	42	05
LGE	42	03

8.3.3 Options

Options OP1...OP7 in the SAM menu can be used for quickly restoring 64 features or settings of the HERCULES part of the TV set to their original default factory values (8 groups of 8 features/settings each). When the decimal value of one option byte OP1...OP7 is changed (see the first table below) then a group of 8 bits, representing 8 HERCULES options or features, is changed as well (see the second table below for a detailed description of the features or settings that are changed). The second table shows which option byte (OP1...OP7) represents which group of 8 option bits. Each bit (0...7) switches a particular HERCULES feature or setting ON or OFF, depending on its value (1 or 0). It is also possible to change the features or settings mentioned in the second table directly at bit level, by means of the NVM Editor in the SAM menu. In the NVM Editor, first the correct NVM address (ADR) has to be entered, then the correct value (VAL, 1 or 0) for each bit (see second table), and finally the settings have to be stored (STORE). For quickly restoring the HERCULES part of the TV set to its original factory settings, however, it is more convenient to simply enter the default factory settings OP1...OP7 that are given in the first table below. How to do this, is described in the next paragraph.

How to Change an Option Byte

As has been explained above, an Option byte (OP) represents a number of different HERCULES options. Changing these bytes directly makes it possible to set all HERCULES options very fast. All options are controlled via seven option bytes. Select the option byte (OP1.. OP7) with the Menu Up/ Down keys, and enter the new (decimal) value. For the correct Factory Default settings, see the first table below. For more detailed information, see the second table.

Leaving the Option submenu saves the changes in the Option Byte settings. Some changes will only take effect after the set has been switched “off” and “on” with the AC power switch (cold start).

Table 8-3 Option codes OP1...OP7

Option table for quickly restoring the HERCULES to its Factory Default settings		
Model number	42PF5521D/10/12	42PF7521D/10/12 50PF7521D/10 (TBD)
OP1	156	156
OP2	229	229
OP3	47	111
OP4	241	241
OP5	252	252
OP6	27	27
OP7	19	19
Options (can be changed only via the SAM menu)	Total decimal value for each option per model number	

How to Change Options at Bit Level

If you wish to know which features or settings of the HERCULES are changed via OP1...OP7, or if you want to change each option or feature bit by bit, use the more detailed table below.  
**Note:** the table below contains only part of the NVM settings that can be changed. A second range of settings and features can be found in Chapter 5 of this manual, in table **NVM Default values**. The settings mentioned there can only be changed via the NVM editor. For further settings, see also the table “ADC Gain and Grey scale alignment” elsewhere in this manual.

Table 8-4 Option codes in detail, at bit level

Option byte & bit table for restoring the TV set to its original Factory Default settings via the NVM Editor in the SAM menu			
	Model number	42PF7521D/10/12	42PF7521D/10/12 50PF7521D/10 (TBD)
<b>OP1</b>	<b>Description of feature/option to be switched ON or OFF</b>		
bit 7 (msb)	OP_PHILIPS_TUNER	1	1
bit 6	OP_FM_RADIO	0	0
bit 5	OP_LNA	0	0
bit 4	OP_ATS // for EU	1	1
bit 3	OP_ACI	1	1
bit 2	OP_UK_PNP	1	1
bit 1	OP_VIRGIN_MODE	0	0
bit 0 (lsb)	OP_CHINA	0	0
	Total DEC Value	156	156
	Total HEX Value	9C	9C
<b>OP2</b>			
bit 7 (msb)	OP_HDMI-2X	1	1
bit 6	OP_IBEX (for DVB)	1	1
bit 5	OP_CHANNEL_NAMING	1	1
bit 4	OP_LTI (Lum Transcient Improvmt)	0	0
bit 3	OP_TILT	0	0
bit 2	OP_FINE_TUNING	1	1
bit 1	OP_BACKLIGHT_DIMMING (for Malibu only)	0	0
bit 0 (lsb)	OP_HUE	1	1
	Total DEC Value	229	231
	Total HEX Value	E5	E5
<b>OP3</b>			
bit 7 (msb)	OP_EW_FUNCTION	0	0
bit 6	OP_PIXEL_PLUS (for Option A)	0	1
bit 5	OP_SCL_RECOVERY	1	1
bit 4	OP_SPLITTER // temp	0	0
bit 3	OP_VIRTUAL_DOLBY	1	1
bit 2	OP_WIDE_SCREEN	1	1
bit 1	OP_WSSB	1	1
bit 0 (lsb)	OP_OP_ME5 // OP_ME5 - 5/6 local buttons implementation	1	1
	Total DEC Value	47	111
	Total HEX Value	2F	6F
<b>OP4</b>			
bit 7 (msb)	OP_LIP_SYNC (for PDP only)	1	1
bit 6	OP_HD	1	1
bit 5	OP_1000P_TEXT	1	1
bit 4	OP_DELTA_VOLUME	1	1
bit 3	OP_TAIWAN_KOREA	0	0
bit 2	OP_VOLUME_LIMITER	0	0
bit 1	OP_STEREO_DBX	0	0
bit 0 (lsb)	OP_STEREO_NICAM_2CS	1	1
	Total DEC Value	241	241
	Total HEX Value	F1	F1
<b>OP5</b>			
bit 7 (msb)	OP_AV1	1	1
bit 6	OP_AV2	1	1
bit 5	OP_AV3	1	1
bit 4	OP_CVI	1	1
bit 3	OP_SVHS2	1	1
bit 2	OP_SVHS3	1	1
bit 1	OP_HOTEL_MODE	0	0
bit 0 (lsb)	OP_SIMPLY_FACTORY=OP_BTSC_AVSTEREO	0	0
	Total DEC Value	252	252
	Total HEX Value	FC	FC
<b>OP6</b>			
bit 7 (msb)	OP_PERSONAL_ZAPPING	0	0
bit 6	OP_SMART_SURF	0	0
bit 5	OP_FMTRAP	0	0
bit 4	OP_COMBFILTER	1	1
bit 3	OP_ACTIVE_CONTROL	1	1
bit 2	OP_VIDEO_TEXT	0	0
bit 1	OP_LIGHT_SENSOR	1	1
bit 0 (lsb)	OP_TWIN_TEXT	1	1
	Total DEC Value	27	27
	Total HEX Value	1B	1B
<b>OP7</b>			
bit 7 (msb)	OP_TIME_WIN1	0	0
bit 6	OP_DVB_USB = OP_MALAY	0	0
bit 5	OP_AMBILIGHT	0	0
bit 4	OP_COLUMBUS	1	1
bit 3	OP_DUMMY6	0	0
bit 2	OP_DUMMY7	0	0
bit 1	OP_WEST_EU	1	1
bit 0 (lsb)	OP_MULTI_STANDARD_EUR	1	1
	Total DEC Value	19	19
	Total HEX Value	13	13

## 9. Circuit Descriptions, Abbreviation List, and IC Data Sheets

Index of this chapter:

9.1 Introduction

9.2 IBO Zapper 2 Module

9.3 Block diagram IBO Zapper 2 Module

9.11 Abbreviation List

9.12 IC Data Sheets

Note:

- Only information that is related ito the IBO Zapper 2 module is published in this manual. For the other information, see the relevant chassis manual (order code on front page).

### 9.1 Introduction

The LC4.41 chassis is a global chassis for the year 2006. It is the successor of the LC4.3 chassis and covers screen sizes of 42 and 50 inch (in 16:9 ratio). It has a new styling, called ME6 (see front page). There are two different picture qualities available, depending on the model: Pixel Plus in the xxPF7521D/10 models, and Digital Crystal Clear in the 42PF5521D/10 and /12 models.

The Digital Video Broadcasting (DVB) TV sets/models discussed in this manual are a combination of a standard TV set and an IBO Zapper 2 module.

### 9.2 IBO Zapper 2 Module

The “IBO Zapper 2” module is meant to receive, process, and transfer Digital Video Broadcasting-Terrestrial (DVB-T) signals to the internal TV interface for audio, video, and control. The “IBO Zapper 2” is intended for use in combination with an analogue TV chassis.

Differences with respect to the earlier version of the IBO zapper module are:

- The PCMCIA connector is different.
- The USB connector has been removed.

### 9.3 Block diagram IBO Zapper 2 Module

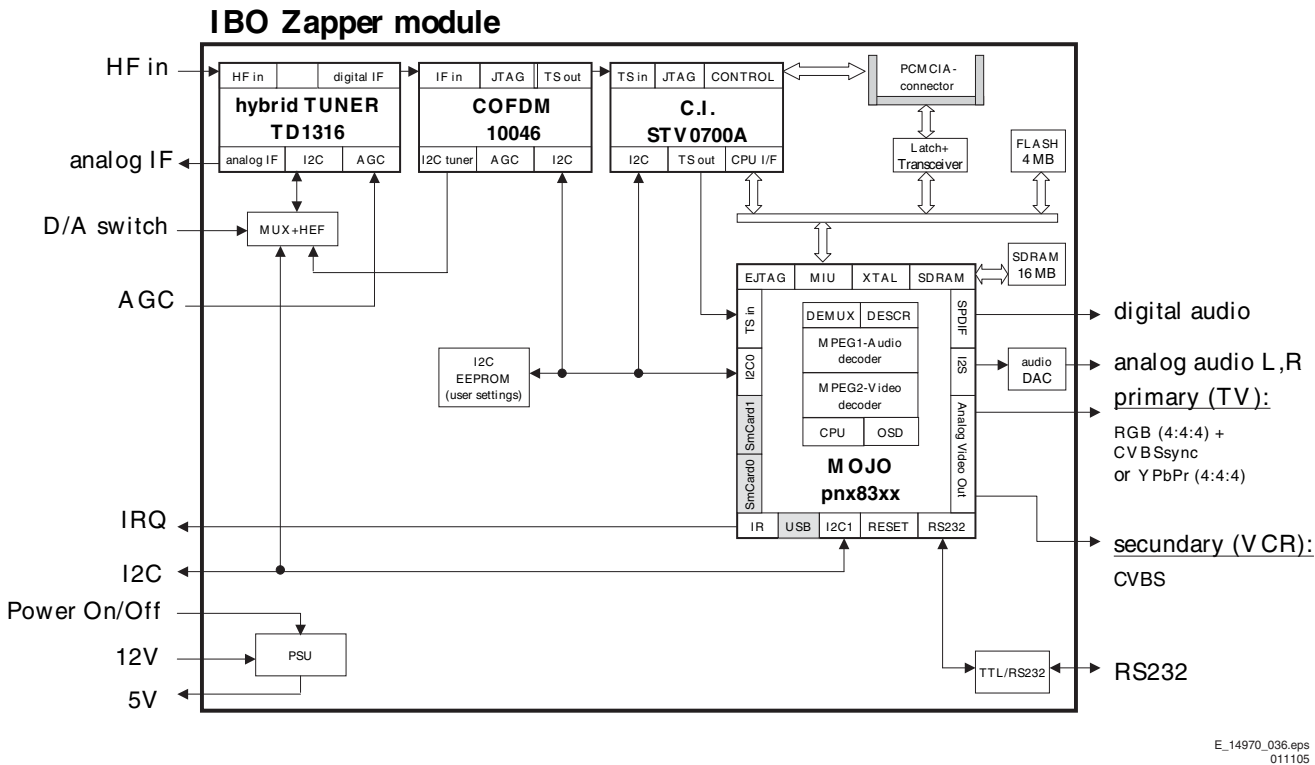


Figure 9-1 Block Diagram IBO zapper 2 module



## 9.4 PNx83xx MOJO

The MOJO is a source decoder chip targeted for very low cost application in integrated digital televisions. The device contains all hardware and software to be able to decode and display MPEG2 transport streams, including:

- Descrambling
- Demultiplexing
- Audio / video decompression
- Video encoding.
- Overlay graphics provisions

Some features of the MOJO are:

- 32-bit PR1910 core operating at 120 MHz.
- 16-bit memory and peripheral interface to connect ROM, NOR Flash and various peripherals.
- Sixteen external interrupt inputs shared with PIO lines.
- Several embedded peripheral units with physical interfaces to:
  - Two UART (RS-232) data ports
  - Two I<sup>2</sup>C master / slave transceivers
  - Two smart-card reader interfaces
  - One Integrated Conditional Access Module interface
- Supports parallel and serial transport stream input interfaces

## 9.5 Front End

The front end of the “IBO Zapper” module is almost identical to the “IBO+” module as used in the A10E with the exception that the Transport Streams that come from the COFDM demodulator are now fed through the PCMCIA controller first. The PCMCIA controller receives encrypted Transport Streams from the COFDM demodulator. Via the PCMCIA card, these encrypted Transport Streams are decrypted, and transported to the MOJO.

## 9.6 Back End

The MOJO is the main building block of the back-end of the “IBO Zapper” module. The IC decodes the MPEG-2 stream into analogue video and digital audio.

### 9.6.1 Transport Stream Input

The Transport Stream input is according to MPEG2 standard. In the “IBO Zapper 2”, only 8-bit parallel is supported. The used TS names are TDA\_DATA.

### 9.6.2 Video Outputs

The MOJO has two analogue video outputs:

- Primary (TV): YUV + RGB
- Secondary (VCR): CVBS

The primary MOJO output is used as input for the TV display and is fed either to the Hercules YUV/RGB input (pins 78/79/80), for teletext insertion purposes, or directly to the analogue Scaler input D2/C2/B2. The signal path is as follows: switch 7G09 chooses between the SCART1 input signal and the YUV/RGB output of the MOJO. The signal selected by switch 7G09 is passed on to one group of the inputs of switch 7E00. The other group of inputs of this switch is connected to the three analogue input pins of the DVI-D connector. The output signal of switch 7E00 is passed on to the Hercules input, pins 78/79/80 and to the Scaler input D2/C2/B2 via switch 7E01 in the MUX-SYNC interface. This switch chooses between the MOJO output signal and the Hercules output signal, which is used for SDTV signals (analogue terrestrial TV reception via the analogue receiving part). The Hercules output is not only used for SDTV signals, but also for MOJO output signals that

were first sent to the Hercules input for e.g. teletext reinsertion purposes before they are passed on to the Scaler.

The secondary MOJO output, which delivers CVBS signals, is used for monitoring purposes or for recording via the SCART 2 output of the TV set. The signal path of the secondary MOJO output is as follows:

the CVBS/VCR signal coming from the MOJO is sent to the Hercules video switch input, pin 58, via switch 7G07. The signal then appears on one of the outputs of the Hercules video switch, pin 48, and is passed on via switches 7219 and 7G10 to pin 19 of SCART 2, which is the CVBS/monitor output. For further details, see the manuals of the original TV sets on which the various models of IBO zappers are based.

### 9.6.3 Audio Outputs

The MOJO has two audio output interfaces:

- SPDIF Out: The SPDIF sound output goes directly to a connector on the back of the module.
- I2S Out: This digital sound output is fed through a DAC and the analogue L/R signals are directly fed into the Hercules.

## 9.7 IBOLink Interface

The IBOLink™ approach is such that the conventional TV microcontroller is re-used when digital functionality is added. In principle, the TV can still operate without the bolt-on module. The IBOLink™ software is added to the TV-set software, and is operating as a software bridge.

## 9.8 Control Interface

The “IBO Zapper” is connected as a slave I<sup>2</sup>C device. The I<sup>2</sup>C bus should be +5V tolerable and operating at 100kHz(MAX). The “IBO Zapper” module slave address is 0xE4 (similar to IBO+) but is configurable via IBOLink.

All communication from digital module to Television chassis has to be initiated via an active low hardware interrupt line from the digital module.

## 9.9 UART Interface

The UART interfaces (Universal Asynchronous Receiver And Transmitter) are serial interfaces, which are used to transfer data and commands between two devices.

The “IBO Zapper” system uses an UART interface for serial communication with a PC for:

- Diagnostic SW for Service or Production
- SW uploading for Service or Development

## 9.10 Power Supply IBO Zapper Module

The “IBO Zapper” module operates from a single 12V supply provided by the TV chassis. All other voltages that the module needs are derived from the +12V. The module has four different physical power states:

- “Off” State.
- “Passive Standby”.
- “Active Standby”.
- “On” State.

Please refer to the LC4.31E AA manual for more information.

## 9.11 Abbreviation List

0/6/12	SCART switch control signal on A/V board. 0 = loop through (AUX to TV), 6 = play 16:9 format, 12 = play 4:3 format	DTS	Digital Theatre System; A multi-channel surround sound format, similar to Dolby Digital
1080i	1080 visible lines, interlaced	DVB	Digital Video Broadcast; A method of transmitting digital audio and video, based on MPEG2
1080p	1080 visible lines, progressive scan	DVB-T	DVB-Terrestrial; HDTV standard for the EU
2CS	2 Carrier Sound (or 2 Channel Stereo)	DVD	Digital Versatile Disc
480i	480 visible lines, interlaced	EEPROM	Electrically Erasable and Programmable Read Only Memory
480p	480 visible lines, progressive scan	EPG	Electronic Program Guide: system used by broadcasters to transmit TV guide information (= NexTVView)
ACI	Automatic Channel Installation: algorithm that installs TV channels directly from a cable network by means of a predefined TXT page	EU	Europe
ADC	Analogue to Digital Converter	EXT	EXTERNAL (source), entering the set by SCART or by cinches (jacks)
AFC	Automatic Frequency Control; Control signal used to tune and lock to the correct frequency	FBL	Fast BLanking; DC signal accompanying RGB signals. To blank the video signal when it is returning from the right side of the screen to the left side. The video level is brought down below the black video level
AGC	Automatic gain control (feedback) signal to the tuner. This circuit ensures a constant output amplitude regardless of the input amplitude	FM	Field Memory; A memory chip that is capable of storing one or more TV picture fields / Frequency Modulation; A technique that sends data as frequency variations of a carrier signal
AM	Amplitude Modulation; A "data encoding to a carrier" method, such that the carrier amplitude is proportional to the data value	FRC	Frame Rate Converter
AP or A/P	Asia Pacific	H	H_sync to the module
AR	Aspect Ratio: 4 by 3 or 16 by 9	HA	Horizontal Acquisition; horizontal sync pulse
ASD	Automatic Standard Detection	HD	High Definition
AV	External Audio Video	HP	HeadPhone
B-SC1-IN	Blue SCART1/EXT1 in	I	Monochrome TV system. Sound carrier distance is 6.0 MHz. VHF- and UHF-band
B-SC2-IN	Blue SCART2/EXT2 in	IBO	Intelligent Bolt On
B-TXT	Blue TeleteXT	I <sup>2</sup> C	Integrated IC bus
B/G	Monochrome TV system. Sound carrier distance is 5.5 MHz. B= VHF-band, G= UHF-band	I <sup>2</sup> S	Integrated IC Sound bus
C-FRONT	Chrominance front input	IC	Integrated Circuit
CBA	Circuit Board Assembly (also called PCB or PWB)	IF	Intermediate Frequency
CL	Constant Level: audio output to connect with an external amplifier	Interlaced	Scan mode where two fields are used to form one frame. Each field contains half the number of the total amount of lines. The fields are written in "pairs", causing line flicker.
CLUT	Colour Look-Up Table	IR	Infra Red
COFDM	COLOUR LUMinance Baseband Universal Subsystem. IC performing noise reduction and 2D/3D comb filtering	IRQ	Interrupt ReQuest
ComPair	Computer aided rePair. A tool for diagnosing a TV through a PC controlled interface	Last Status	The settings last chosen by the customer and read and stored in RAM or in the NVM. They are called at start-up of the set to configure it according to the customer's preferences
CSM	Customer Service Mode	LATAM	LATIn AMerica
CVBS	Composite Video and Blanking Signal; A single video signal that contains luminance, colour, and timing information	LC04	Philips chassis name for LCD TV 2004 project
CVBS-EXT	CVBS signal from external source (VCR, VCD, etc.)	LCD	Liquid Crystal Display
CVBS-INT	CVBS signal from internal Tuner	LED	Light Emitting Diode; A semiconductor diode that emits light when a current is passed through it
CVBS-MON	CVBS monitor signal	L/L'	Monochrome TV system. Sound carrier distance is 6.5 MHz. L' is Band I, L is all bands except for Band I
CVBS-TER-OUT	CVBS TERrestrial OUTput signal	LS	LoudSpeaker
DAC	Digital to Analogue Converter	LVDS	Low Voltage Differential Signalling, data transmission system for high speed and low EMI communication.
DBE	Dynamic Bass Enhancement: extra low frequency amplification	M/N	Monochrome TV system. Sound carrier distance is 4.5 MHz. M= 525 lines @ 60 Hz, N= 625 lines @ 50 Hz
DFU	Directions For Use: Owner's manual	MOSFET	Metal Oxide Semiconductor Field Effect Transistor
DNR	Dynamic Noise Reduction / Digital Noise Reduction; Noise reduction feature of the set	MPEG	Motion Pictures Experts Group. An ISO/IEC body that has given its name
DRAM	Dynamic RAM; dynamically refreshed RAM		
DSP	Digital Signal Processing		
DST	Dealer Service Tool; Special remote control designed for dealers to enter e.g. service mode (a DST-emulator is available in ComPair)		

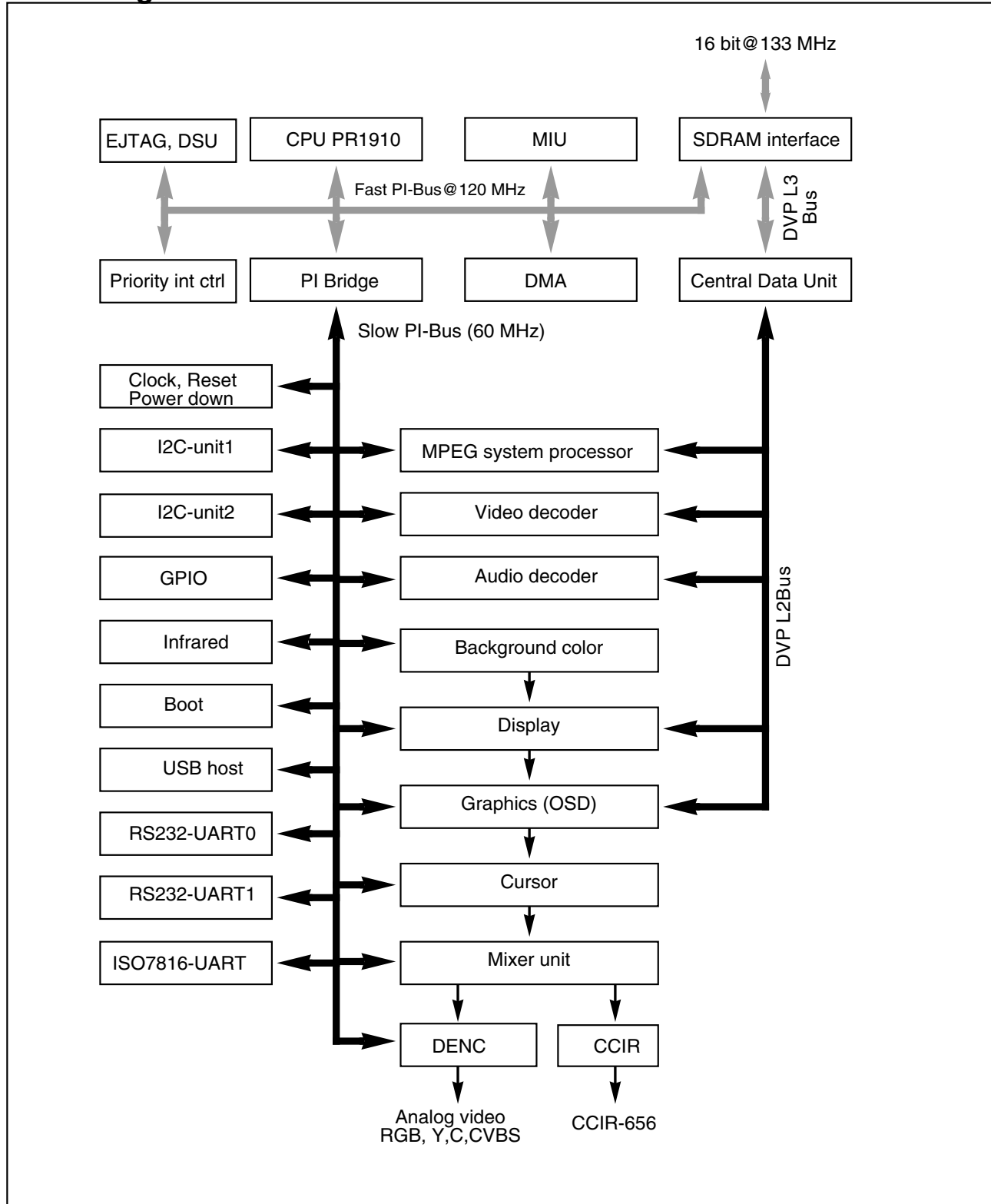
	to an image compressing scheme for moving video	SIF	Sound Intermediate Frequency
MSP	Multi-standard Sound Processor: ITT	SMPS	Switched Mode Power Supply
MUTE	sound decoder	SND	SouND
NC	MUTE Line	SOPS	Self Oscillating Power Supply
NICAM	Not Connected	SPDIF	Sony Philips Digital Interface; a consumer interface, used to transfer digital audio
	Near Instantaneously Companded Audio Multiplexing; This is a digital sound system, mainly used in Europe	SRAM	Static RAM
NOR		STBY	STandBY
NTSC	National Television Standard Committee. Colour system used mainly in North America and Japan. Colour carrier NTSC M/N = 3.579545 MHz, NTSC 4.43 = 4.433619 MHz (this is a VCR norm, it is not transmitted off-air)	SVHS	Super Video Home System
		SW	Software or Subwoofer or Switch
NVM	Non Volatile Memory; IC containing data such as alignment values, preset stations	THD	Total Harmonic Distortion
O/C	Open Circuit	TS	Transport Stream
ON/OFF LED	On/Off control signal for the LED	TXT	Teletext; TXT is a digital addition to analogue TV signals that contain textual and graphical information (25 rows x 40 columns). The information is transmitted within the first 25 lines during the Vertical Blank Interval (VBI)
OSD	On Screen Display		Microprocessor
PAL	Phase Alternating Line. Colour system used mainly in Western Europe (colour carrier = 4.433619 MHz) and South America (colour carrier PAL M = 3.575612 MHz and PAL N = 3.582056 MHz)	uP	Universal Serial Bus
		USB	Universal Serial Bus
PC	Personal Computer	VA	Vertical Acquisition
PCB	Printed Circuit Board (or PWB)	VL	Variable Level out: processed audio output towards external amplifier
PCMCIA	Personal Computer Memory Card International Association	VCR	Video Cassette Recorder
PIG	Picture In Graphic	VGA	Video Graphics Array; 640x480 (4:3)
PIP	Picture In Picture	WD	Watch Dog
PLL	Phase Locked Loop. Used, for example, in FST tuning systems. The customer can directly provide the desired frequency	WYSIWYR	What You See Is What You Record: record selection that follows main picture and sound
Progressive Scan	Scan mode where all scan lines are displayed in one frame at the same time, creating a double vertical resolution.	XTAL	Quartz crystal
		Y	Luminance signal
PWB	Printed Wiring Board (also called PCB or CBA)	Y/C	Y consists of luminance signal, blanking level and sync; C consists of chroma (colour) signal
RAM	Random Access Memory	YPbPr	This is a scaled version of the YUV colour space. Y= Luminance, Pb/Pr= Colour difference signals B-Y and R-Y, other amplitudes w.r.t. to YUV
RC	Remote Control transmitter	YUV	Colour space used by the NTSC and PAL video systems. Y is the luminance and U/V are the colour difference signals
RC5 or 6	Remote Control system 5 or 6, the signal from the remote control receiver		
RGB	Red, Green, and Blue colour space; The primary colour signals for TV. By mixing levels of R, G, and B, all colours (Y/C) are reproduced		
RGBHV	Red, Green, Blue, Horizontal sync, and Vertical sync		
ROM	Read Only Memory		
SAM	Service Alignment Mode		
S/C	Short Circuit		
SCART	Syndicat des Constructeurs d'Appareils Radiorécepteurs et Téléviseurs; This is a 21-pin connector used in EU, that carries various audio, video, and control signals (it is also called Péritel connector)		
SCL	Serial CLock Signal on I <sup>2</sup> C bus		
SD	Standard Definition		
SDA	Serial DATA Signal on I <sup>2</sup> C bus		
SDRAM	Synchronous DRAM		
SECAM	SÉquence Couleur Avec Mémoire; Colour system mainly used in France and East Europe. The chroma is FM modulated and the R-Y and B-Y signals are transmitted line sequentially. Colour carriers= 4.406250 MHz and 4.250000 MHz		

## 9.12 IC Data Sheets

This section shows the internal block diagrams and pin layouts of ICs that are drawn as "black boxes" in the electrical diagrams (with the exception of "memory" and "logic" ICs).

### 9.12.1 Diagram K1, PNx83xx (IC7100)

#### Block Diagram



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020605

Figure 9-2 PNx831x architecture and data paths

## 9.12.2 Diagram K6, TDA10046 (IC7600)

## Block Diagram

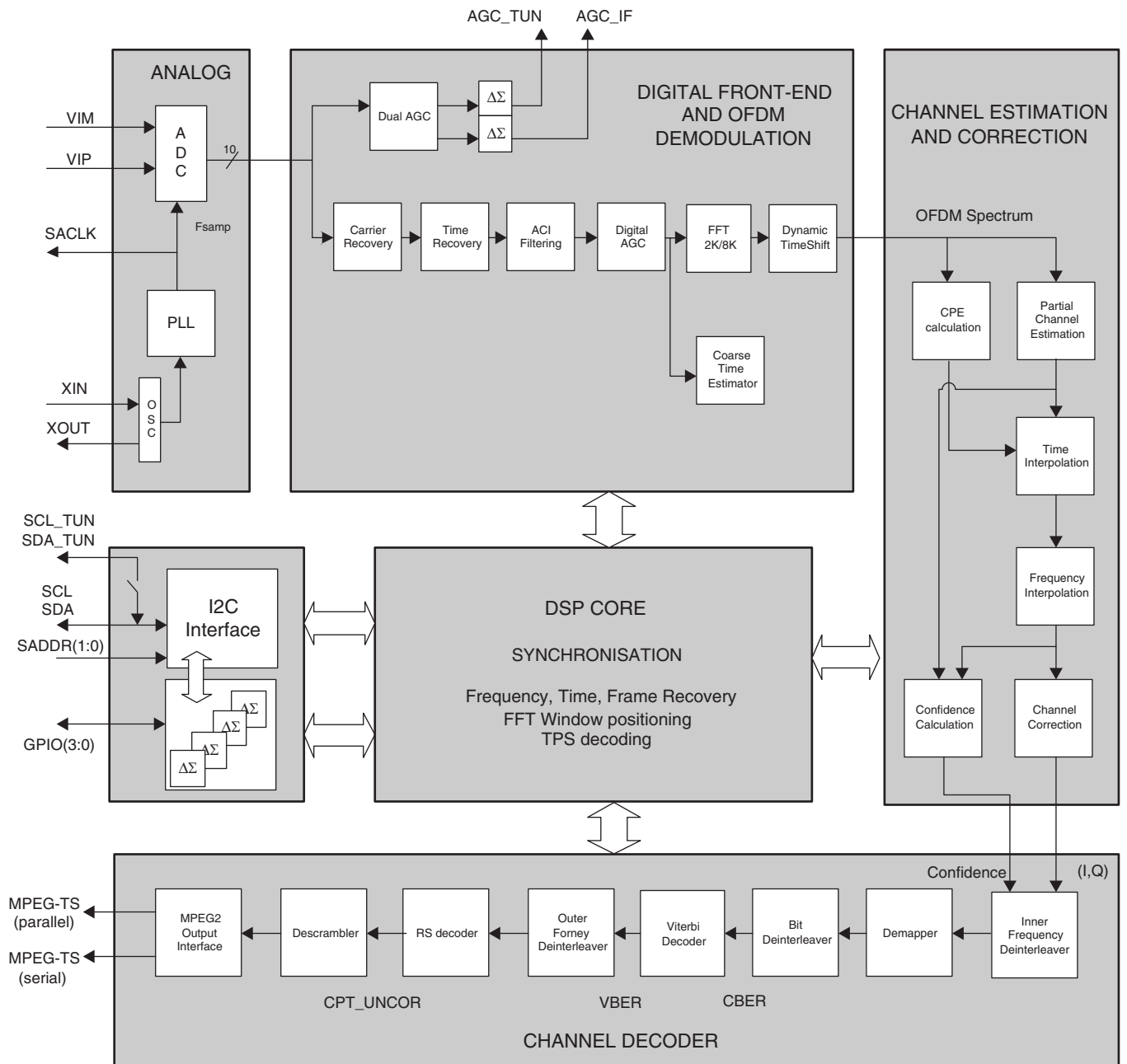
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Figure 9-3 Internal blockdiagram TDA10046

# 10. Spare Parts List

Sets included:		
42PF5521D/10		
42PF5521D/12		
IBO Zapper Panel [K]		
Software		
0601	3139 127 04472	IBO Z2 SW R2C49
Various		
1028	3139 267 20961	IBO Zapper-2.1 panel
1301	2422 025 10768	Connector 3p m
1303	2422 128 02863	Switch tact 1p
1304	4822 252 51187	19398E1(0,500A)
1401	4822 267 31729	Connector cinch 1p
1402	4822 267 10459	Connector 3p
1403	2422 025 18799	Socket USB 4p f
1500	2422 025 18872	Connector 32p f
1600	3112 297 13771	Tuner TD1316A/SPHP
1700	2422 033 00364	Connector smartcard
8301	3139 131 06371	Cable 04p/220/03p
8500	3139 131 05861	Cable 32p/280/32p
8600	3139 131 03761	Cable Phono/280/Phono
—  —		
2100	4822 124 23002	10µF 16V
2101	4822 124 23002	10µF 16V
2102	4822 124 23002	10µF 16V
2103	2238 586 59812	100nF 20% 50V 0603
2104	2238 586 59812	100nF 20% 50V 0603
2105	2238 586 59812	100nF 20% 50V 0603
2106	2238 586 59812	100nF 20% 50V 0603
2107	2238 586 59812	100nF 20% 50V 0603
2108	2238 586 59812	100nF 20% 50V 0603
2109	2238 586 59812	100nF 20% 50V 0603
2110	2238 586 59812	100nF 20% 50V 0603
2111	2238 586 59812	100nF 20% 50V 0603
2112	2238 586 59812	100nF 20% 50V 0603
2113	2238 586 59812	100nF 20% 50V 0603
2114	2238 586 59812	100nF 20% 50V 0603
2115	2238 586 59812	100nF 20% 50V 0603
2116	2238 586 59812	100nF 20% 50V 0603
2119	2238 586 59812	100nF 20% 50V 0603
2120	2238 586 59812	100nF 20% 50V 0603
2121	2238 586 59812	100nF 20% 50V 0603
2130	4822 124 23002	10µF 16V
2131	4822 124 23002	10µF 16V
2132	4822 124 23002	10µF 16V
2133	4822 124 23002	10µF 16V
2203	4822 124 23002	10µF 16V
2204	2238 586 59812	100nF 20% 50V 0603
2206	4822 124 23002	10µF 16V
2207	2238 586 59812	100nF 20% 50V 0603
2208	2238 586 59812	100nF 20% 50V 0603
2209	2238 586 59812	100nF 20% 50V 0603
2210	2238 586 59812	100nF 20% 50V 0603
2211	2238 586 59812	100nF 20% 50V 0603
2212	2238 586 59812	100nF 20% 50V 0603
2213	2238 586 59812	100nF 20% 50V 0603
2214	2238 586 59812	100nF 20% 50V 0603
2300	4822 126 13881	470pF 5% 50V
2301	4822 124 40849	330UF 20% 16V
2302	4822 124 40207	100µF 20% 25V
2304	2020 021 91506	1000µF 20% 16V
2305	2238 586 59812	100nF 20% 50V 0603
2306	4822 124 40207	100µF 20% 25V
2308	4822 126 13881	470pF 5% 50V
2309	4822 124 40849	330UF 20% 16V
2311	2020 021 91687	470µF 20% 16V
2313	4822 126 13881	470pF 5% 50V
2314	3198 017 33330	33nF 20% 16V 0603
2315	4822 124 40849	330UF 20% 16V
2317	4822 124 40207	100µF 20% 25V
2318	2020 021 91687	470µF 20% 16V
2319	2020 021 91634	100µF 25V
2320	2238 586 59812	100nF 20% 50V 0603
2324	3198 017 44740	470nF 10V 0603
2325	3198 017 44740	470nF 10V 0603
2326	3198 017 44740	470nF 10V 0603
2327	2238 586 59812	100nF 20% 50V 0603
2328	2238 586 59812	100nF 20% 50V 0603
2329	4822 126 13193	4.7nF 10% 63V
2330	2020 021 91687	470µF 20% 16V
2331	4822 126 13193	4.7nF 10% 63V
2332	4822 124 40207	100µF 20% 25V
2333	5322 126 11583	10nF 10% 50V 0603
2334	2238 586 59812	100nF 20% 50V 0603
2335	4822 124 12095	100µF 20% 16V
2336	4822 126 13193	4.7nF 10% 63V
2337	4822 124 22652	2.2µF 20% 50V
2403	2238 586 59812	100nF 20% 50V 0603
2405	2238 586 59812	100nF 20% 50V 0603
2406	3198 032 27190	100µF 6.3V
2411	2238 586 59812	100nF 20% 50V 0603
2412	2238 586 59812	100nF 20% 50V 0603
2413	2238 586 59812	100nF 20% 50V 0603
2500	3198 017 41050	1µF 10V 0603
2501	2020 552 94427	100pF 5% 50V
2502	2238 586 59812	100nF 20% 50V 0603
2503	2020 552 94427	100pF 5% 50V
2504	2238 586 59812	100nF 20% 50V 0603
2505	3198 017 41050	1µF 10V 0603
2506	4822 124 12084	1µF 20% 50V
2507	4822 126 13193	4.7nF 10% 63V
2508	3198 017 41050	1µF 10V 0603
2509	2020 552 94427	100pF 5% 50V
2510	2020 552 94427	100pF 5% 50V
2511	2238 586 59812	100nF 20% 50V 0603
2512	4822 124 80151	47µF 16V
2513	3198 017 41050	1µF 10V 0603
2514	4822 124 12084	1µF 20% 50V
2515	4822 126 13193	4.7nF 10% 63V
2516	4822 124 41643	100µF 20% 16V
2517	2238 586 59812	100nF 20% 50V 0603
2521	4822 122 33761	22pF 5% 50V
2522	4822 126 14221	68pF 5% 50V NP0 0603
2523	4822 126 14508	180pF 5% 50V 0603
2525	4822 126 14508	180pF 5% 50V 0603
2526	4822 126 14221	68pF 5% 50V NP0 0603
2528	4822 122 33761	22pF 5% 50V
2529	4822 122 33761	22pF 5% 50V
2530	4822 126 14221	68pF 5% 50V NP0 0603
2531	4822 126 14508	180pF 5% 50V 0603
2533	4822 122 33761	22pF 5% 50V
2534	4822 122 33761	22pF 5% 50V
2535	4822 122 33761	22pF 5% 50V
2536	4822 122 33761	22pF 5% 50V
2537	4822 126 14508	180pF 5% 50V 0603
2538	4822 126 14221	68pF 5% 50V NP0 0603
2543	4822 124 80151	47µF 16V
2544	2238 586 59812	100nF 20% 50V 0603
2550	3198 017 42240	220nF 16V Y5V 0603
2551	3198 017 41050	1µF 10V 0603
2557	4822 124 23002	10µF 16V
2558	2238 586 59812	100nF 20% 50V 0603
2559	4822 122 33761	22pF 5% 50V
2560	4822 122 33761	22pF 5% 50V
2607	2238 586 59812	100nF 20% 50V 0603
2608	2238 586 59812	100nF 20% 50V 0603
2609	2238 586 59812	100nF 20% 50V 0603
2610	2238 586 59812	100nF 20% 50V 0603
2611	2238 586 59812	100nF 20% 50V 0603
2612	2238 586 59812	100nF 20% 50V 0603
2613	2238 586 59812	100nF 20% 50V 0603
2614	4822 124 80151	47µF 16V
2615	2238 586 59812	100nF 20% 50V 0603
2617	2238 586 59812	100nF 20% 50V 0603
2618	2238 586 59812	100nF 20% 50V 0603
2619	2238 586 59812	100nF 20% 50V 0603
2620	2238 586 59812	100nF 20% 50V 0603
2621	4822 124 80151	47µF 16V
2622	4822 124 80151	47µF 16V
2623	2238 586 59812	100nF 20% 50V 0603
2624	2238 586 59812	100nF 20% 50V 0603
2625	2238 586 59812	100nF 20% 50V 0603
2626	2238 586 59812	100nF 20% 50V 0603
2627	2238 586 59812	100nF 20% 50V 0603
2628	2238 586 59812	100nF 20% 50V 0603
2629	2238 586 59812	100nF 20% 50V 0603
2630	2238 586 59812	100nF 20% 50V 0603
2631	2238 586 59812	100nF 20% 50V 0603
2632	4822 122 33741	10pF 10% 50V
2636	4822 124 11947	10µF 20% 16V
2637	2238 586 59812	100nF 20% 50V 0603
2700	2238 586 59812	100nF 20% 50V 0603
2701	2238 586 59812	100nF 20% 50V 0603
2702	2238 586 59812	100nF 20% 50V 0603
2703	2238 586 59812	100nF 20% 50V 0603
2704	2238 586 59812	100nF 20% 50V 0603
2705	2238 586 59812	100nF 20% 50V 0603
2706	4822 124 23002	10µF 16V
2707	4822 124 23002	10µF 16V
2708	2238 586 59812	100nF 20% 50V 0603
2709	4822 124 23002	10µF 16V
2710	2238 586 59812	100nF 20% 50V 0603
2711	2238 586 59812	100nF 20% 50V 0603
2712	2238 586 59812	100nF 20% 50V 0603
2713	4822 124 23002	10µF 16V
2714	5322 126 11578	1nF 10% 50V 0603
2715	2020 552 94427	100pF 5% 50V
~W~		
3100	4822 051 30103	10kΩ 5% 0.062W
3101	4822 051 30103	10kΩ 5% 0.062W
3112	4822 051 30103	10kΩ 5% 0.062W
3116	4822 051 30103	10kΩ 5% 0.062W
3117	4822 051 30103	10kΩ 5% 0.062W
3119	4822 051 30103	10kΩ 5% 0.062W
3128	4822 051 30103	10kΩ 5% 0.062W
3130	4822 051 30103	10kΩ 5% 0.062W
3131	4822 051 30103	10kΩ 5% 0.062W
3133	3198 021 32290	22Ω 5% 0603
3134	3198 021 32290	22Ω 5% 0603
3135	3198 021 32290	22Ω 5% 0603
3137	4822 051 30103	10kΩ 5% 0.062W
3138	4822 051 30103	10kΩ 5% 0.062W
3139	4822 051 30339	33Ω 5% 0.062W
3140	5322 117 13036	1.2kΩ 1% 0.063W 0603
3141	4822 051 30103	10kΩ 5% 0.062W
3142	4822 051 30101	100Ω 5% 0.062W
3143	4822 051 30101	100Ω 5% 0.062W
3144	4822 051 30101	100Ω 5% 0.062W
3146	4822 051 30101	100Ω 5% 0.062W
3147	4822 051 30101	100Ω 5% 0.062W
3151	4822 051 30103	10kΩ 5% 0.062W
3154	4822 051 30103	10kΩ 5% 0.062W
3156	3198 031 13390	4 x 33Ω 5% 1206
3157	3198 031 13390	4 x 33Ω 5% 1206
3158	3198 031 13390	4 x 33Ω 5% 1206
3159	3198 031 13390	4 x 33Ω 5% 1206
3160	4822 051 30339	33Ω 5% 0.062W
3161	4822 051 30339	33Ω 5% 0.062W
3162	4822 051 30339	33Ω 5% 0.062W
3163	4822 051 30103	10kΩ 5% 0.062W
3164	3198 021 32290	22Ω 5% 0603
3200	4822 051 30332	3.3Ω 5% 0.062W
3205	4822 051 30103	10kΩ 5% 0.062W
3206	4822 051 30332	3.3Ω 5% 0.062W
3207	4822 051 30332	3.3Ω 5% 0.062W
3209	4822 051 30101	100Ω 5% 0.062W
3210	4822 051 30101	100Ω 5% 0.062W
3211	4822 051 30103	10kΩ 5% 0.062W
3300	3198 021 31080	1Ω 5% 0603
3301	3198 021 31080	1Ω 5% 0603
3303	3198 021 31080	1Ω 5% 0603
3304	5322 117 13046	1.8kΩ 1% 0.063W 0603
3306	2322 704 61002	1kΩ 1%
3307	2322 704 61001	100Ω 1% 0603
3312	3198 021 31080	1Ω 5% 0603
3313	3198 021 31080	1Ω 5% 0603
3314	3198 021 31080	1Ω 5% 0603
3315	4822 051 30102	1kΩ 5% 0.062W
3316	4822 051 30102	1kΩ 5% 0.062W
3317	2322 704 63302	3.3kΩ 1% 0603
3318	3198 021 31080	1Ω 5% 0603
3319	3198 021 31080	1Ω 5% 0603
3320	3198 021 31080	1Ω 5% 0603
3321	3198 021 31080	1Ω 5% 0603
3322	5322 117 13042	3.9kΩ 1% 0.063W 0603
3323	5322 117 13057	820Ω 1% 0.063W 0603
3324	4822 051 30102	1kΩ 5% 0.062W
3325	4822 117 13632	100kΩ 1% 0603 0.62W
3326	4822 051 30103	10kΩ 5% 0.062W
3327	4822 051 30339	33Ω 5% 0.062W
3328	4822 117 13632	100kΩ 1% 0603 0.62W
3330	3198 021 31820	1.8kΩ 5% 0.062W 0603
3331	2322 704 61001	100Ω 1% 0603
3332	5322 117 13055	75Ω 1% 0.063W 0603
3333	4822 051 30273	27kΩ 5% 0.062W
3334	4822 051 30333	33kΩ 5% 0.062W
3403	4822 051 30103	10kΩ 5% 0.062W
3404	4822 051 30561	560Ω 5% 0.062W
3405	4822 051 30102	1kΩ 5% 0.06

3423	4822 051 30153	15kΩ 5% 0.062W
3500	4822 051 30102	1kΩ 5% 0.062W
3501	4822 117 12968	820Ω 5% 0.62W
3502	4822 051 30683	68kΩ 5% 0.062W
3503	4822 051 30102	1kΩ 5% 0.062W
3504	4822 117 13613	2.2Ω 5% 0.603
3505	4822 117 12968	820Ω 5% 0.62W
3506	4822 051 30333	33kΩ 5% 0.062W
3507	4822 051 30152	1.5Ω 5% 0.062W
3508	4822 117 13613	2.2Ω 5% 0.603
3509	4822 051 30102	1kΩ 5% 0.062W
3510	4822 051 30683	68kΩ 5% 0.062W
3511	4822 117 12968	820Ω 5% 0.62W
3512	4822 051 30101	100Ω 5% 0.062W
3513	4822 051 30101	100Ω 5% 0.062W
3514	4822 051 30102	1kΩ 5% 0.062W
3515	4822 051 30333	33kΩ 5% 0.062W
3516	4822 117 12968	820Ω 5% 0.62W
3517	4822 051 30152	1.5Ω 5% 0.062W
3519	4822 051 30181	180Ω 5% 0.062W
3520	4822 051 30181	180Ω 5% 0.062W
3521	4822 051 30181	180Ω 5% 0.062W
3522	4822 051 30181	180Ω 5% 0.062W
3523	4822 051 30759	75Ω 5% 0.062W
3526	4822 051 30759	75Ω 5% 0.062W
3527	4822 051 30759	75Ω 5% 0.062W
3528	5322 117 11726	10Ω 5%
3530	4822 051 30479	47Ω 5% 0.062W
3533	4822 051 30479	47Ω 5% 0.062W
3539	4822 051 30479	47Ω 5% 0.062W
3543	4822 051 30391	390Ω 5% 0.062W
3544	4822 051 30391	390Ω 5% 0.062W
3545	4822 051 30391	390Ω 5% 0.062W
3547	4822 051 30479	47Ω 5% 0.062W
3557	4822 117 13632	100kΩ 1% 0.603 0.62W
3558	4822 051 30102	1kΩ 5% 0.062W
3559	4822 051 30681	680Ω 5% 0.062W
3560	4822 051 30273	27kΩ 5% 0.062W
3561	4822 051 30271	270Ω 5% 0.062W
3562	4822 051 30151	150Ω 5% 0.062W
3572	4822 051 30561	560Ω 5% 0.062W
3573	4822 051 30151	150Ω 5% 0.062W
3574	4822 051 30151	150Ω 5% 0.062W
3575	4822 117 13632	100kΩ 1% 0.603 0.62W
3576	4822 117 12968	820Ω 5% 0.62W
3577	4822 117 12968	820Ω 5% 0.62W
3578	4822 051 30759	75Ω 5% 0.062W
3579	4822 051 30103	10kΩ 5% 0.062W
3580	4822 051 30102	1kΩ 5% 0.062W
3581	4822 051 30759	75Ω 5% 0.062W
3582	4822 051 30103	10kΩ 5% 0.062W
3583	4822 051 30222	2.2kΩ 5% 0.062W
3584	4822 051 30271	270Ω 5% 0.062W
3585	4822 051 30121	120Ω 5% 0.062W
3586	4822 051 30221	220Ω 5% 0.062W
3588	4822 051 30222	2.2kΩ 5% 0.062W
3589	4822 051 30271	270Ω 5% 0.062W
3590	4822 051 30121	120Ω 5% 0.062W
3591	4822 051 30221	220Ω 5% 0.062W
3593	4822 051 30222	2.2kΩ 5% 0.062W
3594	4822 051 30271	270Ω 5% 0.062W
3595	4822 051 30121	120Ω 5% 0.062W
3596	4822 051 30221	220Ω 5% 0.062W
3598	4822 051 30102	1kΩ 5% 0.062W
3606	4822 051 30101	100Ω 5% 0.062W
3607	4822 051 30101	100Ω 5% 0.062W
3608	4822 051 30103	10kΩ 5% 0.062W
3609	4822 051 30472	4.7Ω 5% 0.062W
3610	4822 051 30472	4.7Ω 5% 0.062W
3612	4822 051 30472	4.7Ω 5% 0.062W
3613	4822 117 13632	100kΩ 1% 0.603 0.62W
3614	4822 117 13632	100kΩ 1% 0.603 0.62W
3615	4822 051 30102	1kΩ 5% 0.062W
3618	4822 117 13632	100kΩ 1% 0.603 0.62W
3619	4822 117 13632	100kΩ 1% 0.603 0.62W
3621	4822 051 30339	33Ω 5% 0.062W
3622	3198 031 13390	4 x 33Ω 5% 1206
3623	4822 051 30472	4.7Ω 5% 0.062W
3624	3198 031 13390	4 x 33Ω 5% 1206
3625	4822 051 30101	100Ω 5% 0.062W
3626	4822 051 30272	2.7kΩ 5% 0.062W
3627	4822 051 30272	2.7kΩ 5% 0.062W
3629	4822 051 30101	100Ω 5% 0.062W
3630	4822 051 30101	100Ω 5% 0.062W
3631	4822 051 30101	100Ω 5% 0.062W
3636	4822 051 30684	680kΩ 5% 0.062W
3637	4822 117 12891	220kΩ 1%
3638	4822 051 30331	330Ω 5% 0.062W
3639	4822 051 30391	390Ω 5% 0.062W
3640	4822 051 30684	680kΩ 5% 0.062W
3641	4822 117 12891	220kΩ 1%
3642	4822 051 30331	330Ω 5% 0.062W
3643	4822 051 30331	330Ω 5% 0.062W
3644	3198 031 13390	4 x 33Ω 5% 1206

3645	4822 051 30103	10kΩ 5% 0.062W
3700	4822 051 30101	100Ω 5% 0.062W
3701	4822 051 30101	100Ω 5% 0.062W
3702	3198 031 13390	4 x 33Ω 5% 1206
3703	3198 031 13390	4 x 33Ω 5% 1206
3704	4822 051 30103	10kΩ 5% 0.062W
3705	3198 031 13390	4 x 33Ω 5% 1206
3707	4822 051 30103	10kΩ 5% 0.062W
3708	4822 051 30103	10kΩ 5% 0.062W
3709	4822 051 30103	10kΩ 5% 0.062W
3710	4822 051 30103	10kΩ 5% 0.062W
3711	4822 051 30103	10kΩ 5% 0.062W
3712	4822 051 30103	10kΩ 5% 0.062W
3713	2322 704 62002	2kΩ 1%
3715	4822 051 30103	10kΩ 5% 0.062W
3716	4822 051 30103	10kΩ 5% 0.062W
3717	4822 051 30103	10kΩ 5% 0.062W
3718	4822 051 30103	10kΩ 5% 0.062W
3719	4822 051 30103	10kΩ 5% 0.062W
3720	4822 051 30103	10kΩ 5% 0.062W
3721	4822 051 30103	10kΩ 5% 0.062W
3722	4822 051 30103	10kΩ 5% 0.062W
3723	3198 031 13390	4 x 33Ω 5% 1206
3724	3198 031 13390	4 x 33Ω 5% 1206
3725	4822 051 30339	33Ω 5% 0.062W
3726	4822 051 30339	33Ω 5% 0.062W
3727	4822 051 30479	47Ω 5% 0.062W
3728	4822 051 30479	47Ω 5% 0.062W
3729	4822 051 30479	47Ω 5% 0.062W
3730	4822 051 30479	47Ω 5% 0.062W
3731	4822 051 30479	47Ω 5% 0.062W
3732	4822 051 30479	47Ω 5% 0.062W
3733	4822 051 30479	47Ω 5% 0.062W
3734	4822 117 13573	4 x 47Ω 5%
3738	4822 051 30479	47Ω 5% 0.062W
3739	4822 051 30479	47Ω 5% 0.062W
3740	4822 051 30479	47Ω 5% 0.062W
3741	4822 051 30479	47Ω 5% 0.062W
3742	4822 051 30479	47Ω 5% 0.062W
3743	4822 051 30479	47Ω 5% 0.062W
3744	4822 051 30479	47Ω 5% 0.062W
3745	4822 051 30479	47Ω 5% 0.062W
3746	4822 051 30479	47Ω 5% 0.062W
3747	4822 051 30479	47Ω 5% 0.062W
3748	4822 051 30479	47Ω 5% 0.062W
3749	4822 051 30339	33Ω 5% 0.062W
3750	4822 051 30339	33Ω 5% 0.062W
3751	4822 051 30472	4.7Ω 5% 0.062W
3752	4822 051 30472	4.7Ω 5% 0.062W

5100	4822 157 11499	Bead 60Ω at 100MHz
5101	4822 157 11717	Bead 50Ω at 100MHz
5102	4822 157 11717	Bead 50Ω at 100MHz
5103	4822 157 11717	Bead 50Ω at 100MHz
5201	4822 157 11499	Bead 60Ω at 100MHz
5202	4822 157 11499	Bead 60Ω at 100MHz
5203	4822 157 11499	Bead 60Ω at 100MHz
5300	2422 536 00491	47μH
5301	4822 157 10452	10μH 10%
5302	2422 535 94639	10μH 20%
5303	2422 536 00548	100μ
5304	4822 157 10452	10μH 10%
5306	4822 157 10452	10μH 10%
5307	2422 535 94639	10μH 20%
5309	3198 018 90050	Bead 1kΩ at 100MHz
5401	4822 157 11499	Bead 60Ω at 100MHz
5420	2422 549 44197	Bead 220Ω at 100MHz
5502	4822 157 11499	Bead 60Ω at 100MHz
5504	4822 157 11499	Bead 60Ω at 100MHz
5505	4822 157 11499	Bead 60Ω at 100MHz
5507	4822 157 11499	Bead 60Ω at 100MHz
5508	4822 157 11499	Bead 60Ω at 100MHz
5511	3198 018 53380	3.3μH 10% 0.603
5512	3198 018 53380	3.3μH 10% 0.603
5513	3198 018 53380	3.3μH 10% 0.603
5514	3198 018 53380	3.3μH 10% 0.603
5515	4822 156 21729	Bead 1kΩ 100MHz 0805
5528	4822 157 11499	Bead 60Ω at 100MHz
5600	4822 157 11499	Bead 60Ω at 100MHz
5601	4822 157 11499	Bead 60Ω at 100MHz
5602	4822 157 11499	Bead 60Ω at 100MHz
5604	4822 157 11499	Bead 60Ω at 100MHz
5700	4822 157 11499	Bead 60Ω at 100MHz
5701	4822 157 11499	Bead 60Ω at 100MHz
5702	4822 157 11499	Bead 60Ω at 100MHz
5703	4822 157 11499	Bead 60Ω at 100MHz
5704	4822 157 11499	Bead 60Ω at 100MHz



6300	9322 128 70685	SMSS14
6303	9322 128 70685	SMSS14
6304	9322 128 70685	SMSS14
6307	9965 000 20150	1N4148WS SOD-323
6308	9340 548 48115	PDZ3.6B
6400	9340 548 52115	PDZ5.1B
6401	4822 130 10837	UDZS8.2B
6403	4822 130 10837	UDZS8.2B
6503	4822 130 11397	BAS316
6507	4822 130 11397	BAS316
6508	4822 130 11397	BAS316
6509	4822 130 11397	BAS316
6510	4822 130 11397	BAS316
6511	4822 130 11397	BAS316
6512	4822 130 11397	BAS316
6513	4822 130 11397	BAS316
6514	4822 130 11397	BAS316
6515	9322 129 41685	BZM55-C12



7100	9352 773 55557	PNX8314HS/C102
7200		For SW see item 0601
7202	9322 217 26668	MT48LC8M16A2P-6A
7203	9322 130 41668	M24C64-WMN6
7300	4822 209 60059	MC34063AP1
7301	9322 184 19687	LD1117V18
7302	9322 216 98687	LD1117V
7303	4822 209 60059	MC34063AP1
7305	4822 209 60059	MC34063AP1
7306	9322 165 15685	NCP303LSN30
7307	9322 202 15687	LD1117V50
7308	9322 202 15687	LD1117V50
7309	4822 130 60373	BC856B
7310	3198 010 70510	TL431CZ
7311	9322 231 51685	FET NTR4501NG
7312	5322 130 60159	BC846B
7402	5322 130 60159	BC846B
7403	9322 150 49668	LM3525M-H
7500	4822 130 60373	BC856B
7501	5322 130 60159	BC846B
7502	9352 668 47118	UDA1334BTS/N2
7503	4822 130 60373	BC856B
7504	5322 130 60159	BC846B
7507	5322 130 60159	BC846B
7511	4822 130 60373	BC856B
7512	5322 130 60159	BC846B
7518	4822 130 60373	BC856B
7519	5322 130 60159	BC846B
7520	5322 130 60159	BC846B
7521	4822 130 60373	BC856B
7522	5322 130 60159	BC846B
7523	4822 130 60373	BC856B
7524	4822 130 60373	BC856B
7525	5322 130 60159	BC846B
7526	4822 130 60373	BC856B
7527	4822 130 60373	BC856B
7528	5322 130 60159	BC846B
7529	4822 130 60373	BC856B
7600	9352 732 45557	TDA10046AHT/C1
7601	5322 209 70225	LM393D
7605	9352 630 16165	74AHC1GU04GW
7606	9352 630 16165	74AHC1GU04GW
7700	9322 227 91671	STV0700L
7701	9352 190 10118	74LVC573ADB
7702	9352 190 10118	74LVC573

# 11. Revision List

Manual xxxx xxx xxxx.0

- First release.